The RUBBER AGE

VOL. 26, NO. 11 MARCH 10, 1930

LATE NEWS of the Industry

Tire Output Dropped 6.1% in 1929; December Total Lowest Since 1923

WITH production of pneumatic casings during December the lowest for any month since September, 1923, the total output of tires for the full year of 1929 showed a sharp decline of 6.1 per cent from the previous year. According to the statistics compiled by the Rubber Manufacturers Association, actual production of all types of pneumatic, solid and cushion tires last year reached a total of 73,853,354, as compared with the 1928 figure of 78,622,448 units.

During 1929, tire production in the United States was divided into 73,307,562 pneumatic casings and 545,792 solid and cushion tires, representing a decline for both classes. The output in 1928 consisted of 77,943,817 pneumatic casings and 678,631 solid and cushion tires. More balloon casings, however, were produced in 1929 than in 1928 or any previous year; the real significance of the decline in volume last year was to be found in the passing out of the high pressure casing to a very minor place of importance in comparison to its low pressure successor.

The drop in the production of inner tubes last year was even more marked than that of casings. During 1929, a total of only 73,417,181 tubes were turned out, as compared with 80,179,841 in the year previous.

That the larger and heavier low pressure tire is coming into greater prominence was also shown by the fact that, despite the lower output, the amount of crude rubber used in casings, tubes, and solid and cushion tires increased to 373,304 long tons in 1929 from 357,395 long tons in 1928. These figures represent the totals of the monthly reports compiled by the Rubber Manufacturers Association. The amount of cotton fabric consumed last year, according to the same source, was 278,432,871 pounds, as against a 1928 total of 296,324,531 pounds.

December production of pneumatic casings, the lowest for any month in more than six years, was 3,261,089, comparing with 3,603,436 in November and with 5,604,832 in December, 1928. Output of balloon casings was the lowest for any month since November, 1927, but the real decline was to be found in high pressure casings. December production of the latter, at only 879,213 casings, was probably the lowest monthly total in the past decade, if not for an even longer period.

The same features was to be noted in December inner tube production, which totaled 3,716,161 units, as compared with 3,780,419 in November and 5,183,961 in December, 1928. The output of balloon inner tubes in December was actually higher than that for November, but the total production was lower than for any month since April, 1922.

December production of solid and cushion tires was 37,936, as against 40,667 in November and 42,335 in December, 1928. While low, this figure was not the lowest for the year, as only 36,936 solid and cushion tires were produced in September, 1929.

Goodyear Tire & Rubber Company Votes to Increase Common Stock

STOCKHOLDERS of the Goodyear Tire & Rubber Company will be asked to vote at their annual meeting on March 31 on a proposal to increase the authorized common stock from 1,450,000 shares to 5,000,000 shares. The possibility that the additional common will be used in the future for the acquisition of other companies through an exchange of stock is suggested by President P. W. Litchfield in his letter to stockholders.

"The issuance of additional common stock during the past 18 months," Mr. Litchfield says, "has practically exhausted the authorized but unissued capital, and while your company has no immediate purpose in view for which additional shares might be required in the present state of the industry, there may develop opportunities to acquire on advantageous terms property valuable to your company and which your board should be in a position to act upon." Stockholders will also be asked to authorize the board to issue at its discretion the balance of authorized first preferred stock.

At the close of 1929, there were outstanding 1,398,139½ shares of Goodyear common stock, leaving only 51,860½ shares unissued of the present authorized capital. The announcement of the stock increase has lent further force to the reports that Goodyear will absorb the Seiberling Rubber Company and at some later date be ready to consider the possibility of a merger with the United States Rubber Company. Other rumors have linked the stock increase with the development of new airship transportation lines and also with the possibility of a stock split-up sometime in the future.

Election of the board of directors will be another matter to come before the Goodyear shareholders at the meeting on March 31. The present board was elected for three years, the terms of the members expiring on April 1. It is generally expected that the Cyrus S. Eaton-Otis & Company group of Cleveland financiers together with Akron rubber men, including F. A. Seiberling, will obtain greater representation on the board at this session.

February Rubber Consumption Placed At 32,000 Tons by Exchange Members

DESPITE the shorter working month, consumption of crude rubber in the United States during February totaled approximately 32,000 long tons, according to an estimate made by members of the Rubber Exchange of New York and released by that body. This compares with actual consumption of 36,669 long tons in January, according to the statistics compiled by the Rubber Manufacturers Association, and with 41,594 long tons in February, 1929. The estimate by the exchange members is the same figure at which they estimated January consumption and which proved 4,669 long tons too low.

While this estimate indicates that last month's operations were only 77 per cent of those of the same period a year ago, the Rubber Exchange finds them "disclosing a continued high rate of daily operations at tire factories when it is considered that February has four fewer working days than January."

Inasmuch as the rate of February crude rubber consumption in this country has averaged 31,745 long tons for the past seven years, the estimate by the members of the Rubber Exchange would not seem to indicate the improvement that has been looked for, especially in view of the fact that 1930 is expected to be a record year in the production of tires for replacement and in the manufacture of footwear, mechanical and miscellaneous rubber goods. This estimate, if correct, would also mean that stocks of crude rubber on hand in this country were well over 125,000 long tons at the end of February.

Kelly-Springfield Tire Company Shows Net Loss of $1,346,418 During 1929

THE financial report of the Kelly-Springfield Tire Company for the year ended December 31, 1929, shows a net loss of $1,346,418 after interest, depreciation and sundry deductions. This compares with a 1928 loss of $2,490,513 after interest, amortization, depreciation and loss from participating in the crude rubber agency.

A statement of the company's deficit shows that the sum of $425,000 was set up from capital account as a provision for fluctuation in crude rubber commitments and for other contingencies. This, together with the 1929 loss, increases the deficit from $1,285,590 to $3,057,008. A revaluation of the factory at Cumberland, Md., and of all equipment was made by the American Appraisal Company as of January 1, 1929; and the reduction of the cost of the plant in 1921 to this replacement value, less excess of depreciation taken prior to 1929 on the original cost over that chargeable on replacement value, causes another $2,309,068 to be added to the deficit, making a total of $5,366,075.

"The expected improvement in operations of your company for the year 1929 was not realized," says Samuel Woolner, Jr., president, in his letter to stockholders. "During the year there were three cuts in prices of tires, which materially affected the operating income. In addition, the sales of your company were materially reduced during the last quarter of the year, due to the general business recession. A very substantial loss was also sustained because of the decline in the price of raw materials, the inventories of crude rubber and fabric as well as the inventory of finished goods on hand, having been valued at the end of the year at cost or market, whichever was lower."

During the year all of the outstanding ten-year sinking fund gold notes of the company, amounting to $4,000,000 were paid in full. In contrast to the earnings statement, the balance sheet shows a highly satisfactory financial condition, the ratio of current assets to current liabilities at December 31 being somewhat better than 16 to 1, with a working capital of $11,500,533. Current assets totaled $12,257,444 and current liabilities $756,911.

The company's plant and equipment at Cumberland were maintained in a high state of efficiency and economies both in manufacturing and distribution of the company's products are being put in effect, according to Mr. Woolner, from which further reduced operating costs are anticipated.

Income account for the year 1929 compares with the three preceding years as follows:

	1929	1928	1927	1926
Gross profits	$5,732,758	$5,698,815	$8,367,963	*$4,716,602
Operating expense	6,180,220	5,570,810	6,492,445	6,359,218
Operating loss	$477,462	‡$128,005	‡$1,875,518	$1,642,616
Other income	197,733	89,857	172,422	224,610
Loss	$249,729	‡$217,862	‡$2,047,940	$1,418,006
Interest, etc.	169,666	1,022,215	748,529	849,043
Crude rubber loss	.....	505,448	.....	.....
Depreciation, etc.	927,023	1,180,712	941,670	1,172,750
Net loss	$1,346,418	$2,490,513	†$357,741	$3,439,799

*Includes $1,000,000 reserve previously provided for fluctuations of crude rubber prices. †Net profit. ‡Profit.

Acquisition of Miller Rubber Company Adds $16,257,606 to Goodrich Assets

THE pamphlet report of the B. F. Goodrich Company for the year ended December 31, 1929, shows that the recent acquisition of the Miller Rubber Company has added $16,257,606 to the total assets of the firm. The consolidated balance sheet as of December 31 shows total assets at $163,695,965, while a pro forma statement giving effect to the Miller acquisition shows total assets as $179,953,571 for the same date. Total assets on December 31, 1928, before the Hood merger, were $117,071,002.

The giving effect to the Miller acquisition also increases the amount of bills payable of Goodrich from $23,681,932 to $28,831,932. Accounts payable are also increased from $5,572,048 before the merger to $6,172,914.

The final report for Goodrich operations last year shows that net profit for the twelve months of 1929 was $7,446,310 after depreciation, interest, federal taxes and minority interest, equivalent after 7 per cent preferred dividend requirments, to $5.10 a share on 1,006,886 average number of shares of no-par common stock outstanding during the year and to $4.53 a share on 1,132,388 common shares outstanding at the end of the year, including shares subscribed for by employes. After payment of common and preferred dividends, there was a surplus of $1,098,996 as against a deficit at the end of 1928 of $1,831,411.

Pro forma balance sheet of the B. F. Goodrich Company after giving effect to the acquisition of net assets of the Miller Rubber Company and subsidiaries as of December 31, 1929, follows:

Assets: Capital assets after depreciation, $74,922,266; investments and advances to other companies, $2,399,874; cash, $12,073,566; accounts and notes receivable, $36,588,645; inventories, $50,506,123; due from employes on stock purchase, $161,385; securities of subsidiaries purchased for sinking fund, $188,000; preferred stock in treasury, $1,192,700; deferred charges, $1,921,012; total, $179,953,571.

Liabilities: 7 per cent preferred stock, $32,720,000; common stock (excluding intangible capital assets; namely, patents, trade-marks and good-will amounting to $57,798,001) represented by 1,167,142 no-par shares, $39,871,379; employes' net credits on subscriptions to 78,750 shares of common stock, $468,426; first mortgage gold bonds, $21,572,000; bonded indebtedness of subsidiaries, $12,152,640; mortgages and land contracts payable of subsidiaries,

$95,712; minority interests, $2,504,722; bills payable, $28,831,932; accounts payable, $6,172,914; sundry accrued liabilities, $1,383,186; provision for federal taxes, $714,522; reserves for contingencies, $6,749,610; other reserves, $969,004; surplus, $25,747,524; total, $179,953,571.

The consolidated income account of the B. F. Goodrich Company and subsidiaries for the year of 1929, compared with the three previous years, follows:

	‡1929	¶1928	¶1927	¶1926
Net sales	$164,494,957	$148,805,178	$151,684,960	$148,391,478
Mfg. exp.	151,074,888	139,790,818	132,389,668	†138,640,094
Profit	$13,420,069	$9,014,360	$19,295,292	$9,751,384
Other inc.	1,903,647	916,808	1,219,602	770,289
Total inc.	$15,323,716	$9,931,168	$20,514,894	$10,521,673
Deprec.	3,991,580	3,303,021	3,007,490	2,481,102
Int., etc.	2,950,591	3,535,567	2,927,098	2,975,461
Federal tax	690,000	433,000	1,800,000	.....
Minimum int.	245,235	146,557	.....	.....
Reserve	.....	.....	*1,000,000	.....
Net profit	$7,446,310	$3,513,023	$11,780,306	$5,065,110
Pfd. div.	2,311,190	2,394,350	2,477,510	2,560,670
Com. divs.	4,036,124	2,950,084	2,406,840	2,406,240
Sulplus	$1,098,996	§$1,831,411	$6,895,956	$98,200

*Set up for contingencies and to cover possible losses due to fluctuations in prices of raw material. †After deducting $5,000,000 transferred from contingency reserve. ‡Includes Hood Rubber Company, Inc., and subsidiaries for four months. ¶Excludes Hood Rubber Company, Inc., and subsidiaries. §Deficit.

Raybestos-Manhattan, Inc., Reports Net Of $3,206,294 During Year of 1929

FOR the year ended December 31, 1929, Raybestos-Manhattan, Inc., reports a net profit of $3,206,294 after depreciation, federal taxes and after inventory write-offs of $343,535, equivalent to $4.74 a share on 676,012 no-par shares of common stock. This compares with earnings by its predecessor companies of $2,465,586 in 1928, equal to $3.64 a share on the same basis.

Net sales of the new consolidation for 1929 totaled $22,290,619 as against $21,088,883 in the preceding year. Raybestos-Manhattan, Inc., was formed last spring as the result of a merger of the Manhattan Rubber Company, Passaic, N. J., the Raybestos Company, Bridgeport, Conn., and the United States Asbestos Company, Mannheim, Pa. Last month it was announced that the Wright & Corson Company, rivet manufacturers of Milford, Conn., had also been acquired.

While the other units in the organization specialize in asbestos brake lining, the Manhattan Rubber Manufacturing Company had long been one of the best known producers of mechanical rubber goods, having been incorporated in 1893. In addition to manufacturing hose, belting, packing, molded goods and brake lining, it owns plantations in Java on which it grows 10 per cent of its crude rubber requirements.

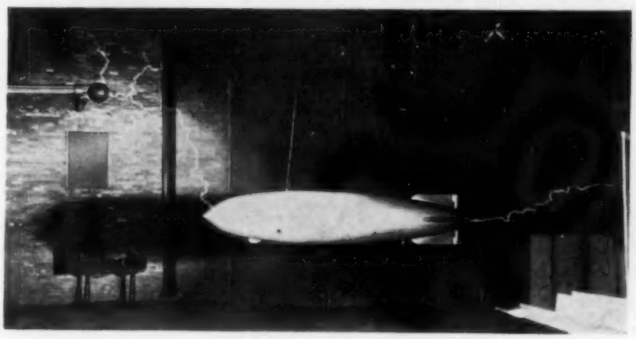
Consolidated balance sheet of Raybestos-Manhattan, Inc., and subsidiaries as of December 31, 1929, follows:

Assets: Land, buildings, machinery and equipment, less depreciation, $7,542,829; cash, $1,437,113; call loans, $1,600,000; municipal bonds, $350,000; marketable securities, $84,682; notes, accounts, etc., receivable, $1,731,907; inventories, $4,758,906; investments and advances, $969,511; sundry notes and accounts receivable (not current), $175,102; organization expenses, $128,958; trade-name, trademarks and good-will, $595,157; preferred charges, $79,425; total, $19,453,590.

Liabilities: Capital stock (represented by 676,012 no-par shares), $9,718,625; accounts payable, $605,092; accrued salaries and wages, $108,930; federal and state tax reserve, $429,177; contingent reserve, $425,000; reserve for stockholders of predecessor company who have not exchanged stock, $6,940; earned surplus, $2,302,766; capital surplus, $5,857,060; total, $19,453,590.

Goodyear-Zeppelin Corporation Makes Lightning Tests on Airship Models

TESTS as to the effect of lightning bolts on dirigible aircraft were recently made in the outdoor laboratories of the Ohio Insulator Company, at Barberton, O., using a model airship provided by the Goodyear-Zeppelin Corporation. The tests indicated that there is little danger to be expected from this source and the only damage done to the model was a small pinprick in the fabric at the point where the bolt struck. The fabric itself will not sustain fire, and while it can be charred by a flame such as a lightning bolt, blow torch or other artificial sources of heat, the decomposition immediately ceases when the heat is withdrawn. In these particular tests the fabric turned brown where the 2,000,000 volt blast struck it but did not rupture the bag, other than a pinhole and no flame resulted. The tests were made on a scale model of one of the proposed commercial Zeppelins and were conducted under the direction of Arthur O. Austin, chief engineer of the Goodyear-Zeppelin Corporation.



Model Airship Receiving a 2,000,000-Volt Blast of Artificial Lightning

Society for Testing Materials Will Conduct Spring Meetings This Month

MEMBERS of Committee D-13 on Textiles of the American Society for Testing Materials will hold their spring meeting at Charlotte, N. C., on March 13 and 14. Several subcommittee and section sessions have been scheduled, and there will be papers on "The Testing Laboratory and Its Relation to Textile Mill Work" by R. H. Adams, of Cason J. Callaway Company; "Variations in Length of Cotton Fibers" by H. W. Barre, director of research, South Carolina Agricultural Experimental Station; "Progress in Cotton Fiber Studies" by R. W. Webb, United States Department of Agriculture; and "Humidity Control" by E. C. Gwaltney, of the Morgan Mills. Professor Appel will present a paper with reference to Mr. Gwaltney's regain measuring apparatus, and Mr. Appel, chief of the Textile Section of the Bureau of Standards, will demonstrate a "flexometer" developed for measuring the stiffness and resiliency of fabrics and, thereby, the draping quality.

Committee D-11 on Rubber Products and other committees of the society will meet at the annual spring group meeting at Detroit, Mich., from March 17 to 21. On March 19, Walter C. Keys, of the United States Rubber Company, will speak on "Advances in Rubber for Automotive Use."

(Other news of the industry will be found on Pages 605-611)

Pacific Goodrich Rubber Company Laboratories

A Description of the Tests and Controls Over All Raw Materials Before Release to the Mills—General Layout and Floor Plans Follow the General Scheme of Straight Line Production as Found in the Main Factory

By WILLARD D. MORGAN

AT THE Pacific Goodrich Rubber Company's new plant in Los Angeles is to be found the most complete and up-to-date rubber testing laboratories in the West. Everything is concentrated upon the quality of the finished product. Complete equipment, as well as rigid specifications have been put into effect to maintain the control of all raw materials entering the plant, as well as the finished tire.

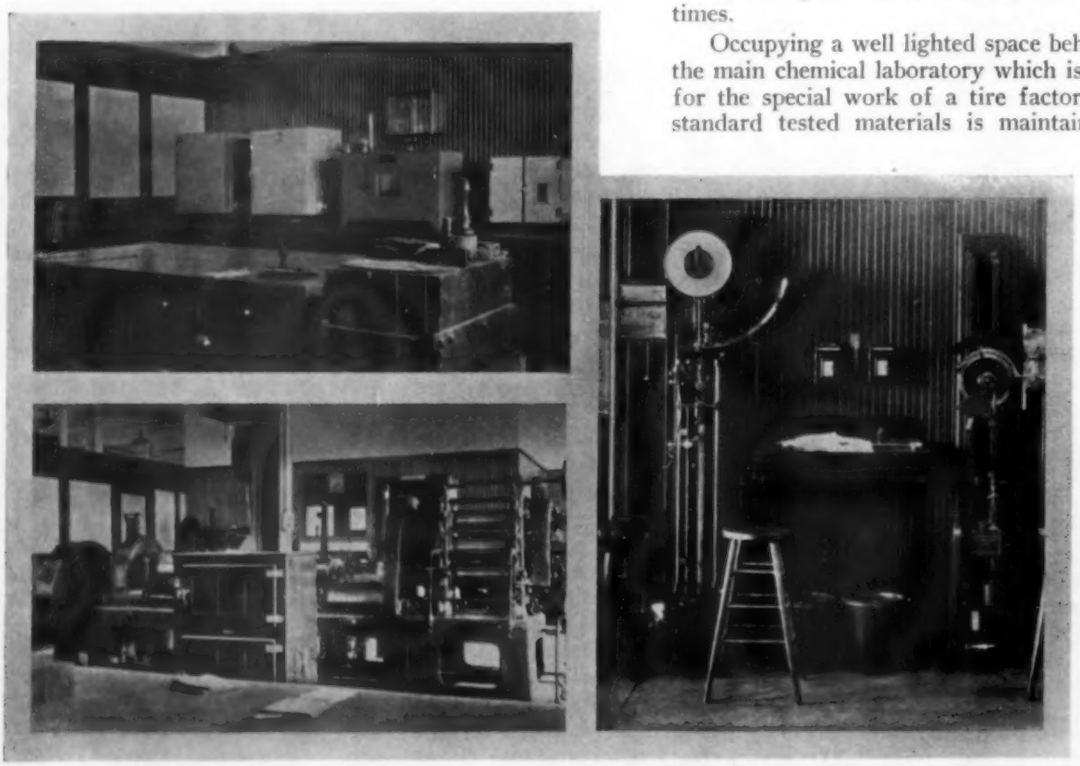
There is a noticeable absence of elaborate set-ups for development or research work, and as this is a control laboratory, the general layout and floor plans have been selected to follow the general scheme of straight line production as is found in the factory*. The laboratory is located in close proximity to the raw materials warehouse, as all incoming material such as rubber, fabric, pigments and miscellaneous ingredients must be tested and approved before releasing into the mill.

*See THE RUBBER AGE for July 25, 1929, pages 425 and 426.

Main Laboratories

Just as the production of tires proceeds from one department to another on the main floor in a straight line, so do materials pass through the laboratories. Adjacent to the offices is the first room of the laboratory proper. Here are located two complete microscopes of 550 and 2000 magnification, the smaller instrument being used for routine examination of regular pigments, while the more complete and up-to-date high powered microscope is used in the examination of materials from new sources of supply, as well as small particle size materials which the smaller microscope does not bring out. Adjacent to the microscope room is the stock room which assures a reserve supply of chemicals as well as glassware and other laboratory supplies at all times.

Occupying a well lighted space behind the stock room is the main chemical laboratory which is thoroughly equipped for the special work of a tire factory. A large stock of standard tested materials is maintained for use as type



Upper Left—Conditioning and Aging Ovens in Physical Testing Laboratory

Lower Left—Experimental Mill and Calender Line with Conditioning Cabinet in Foreground

Right—Scott Autographic Rubber and Cord Testing Machines

samples with which to compare new materials submitted, as well as checking routine shipments from the same supplier.

The entire chemical laboratory is noticeable for its efficiently planned layout and equipment. In it are found a standard Saybolt universal viscosimeter for determining the viscosity of oil softeners. Nearby is the New York Testing Laboratories penetrometer for the determination of hardness of plastic waxes and mineral rubbers.

The balance table is occupied by a Christian Becker chainomatic balance which is available at all times for very fine weighing. There is also found a Braun electrolytic cabinet for the determination of metals by the electric deposition method. This apparatus is quite complete with ammeter and resistances included in the cabinet. Revolving platinum stirrers keep the solutions well agitated and the metal is deposited on the platinum gauge, which acts as the opposite terminal. The same motor is used for the operation of the Parr standard calorimeter, which is used in the control of fuel oils for the power plant.

Throughout the laboratory is found De Khotinsky constant temperature electric ovens and there is also to be found a De Khotinsky constant temperature vacuum oven, which is essential in the work of this laboratory. Under the ventilating hood is the steam bath equipment, two multiple unit electric furnaces used for ash determination, as well as other electric hot plates for digestions and evaporations.

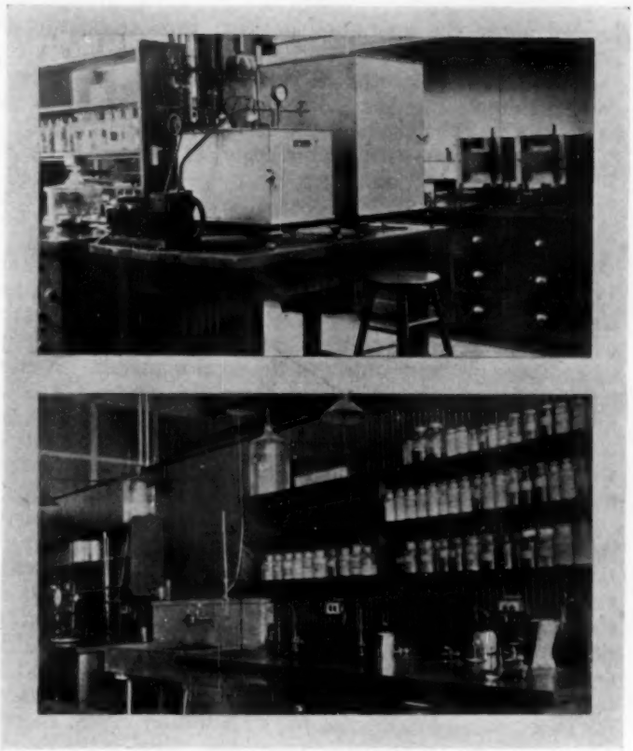
There is also found a very efficient piece of equipment designed in this laboratory for the determinations of, water solubilities, chloroform extracts, acetone extracts, alkalinites, and other work of a similar nature. The constant cooling device is provided by having a system of control water through individual coils to a common drain line. This assures a constant circulation for each individual sample rather than a series as is usually found in laboratories of this type.

Distilled water is provided by means of a steam still containing removable lead pipes which are easily cleaned. This unit also furnishes water for the battery charging station, as well as the storage battery equipment in the power house. The testing of gasolines and distillations of volatile solvents is done on an electric unit approved by the American Petroleum Institute and made by the Precision Scientific Company.

Ample storage space for miscellaneous equipment and samples are found in a well layed out system of cupboard and drawers located under the laboratory tables.

Preparation Laboratory

After the material has passed through the chemical laboratory it goes to the preparation laboratory for compounding in standard test recipes or in regular production formulas as used in the tire mill. A small compounding room adjacent to the mill line provides convenient space



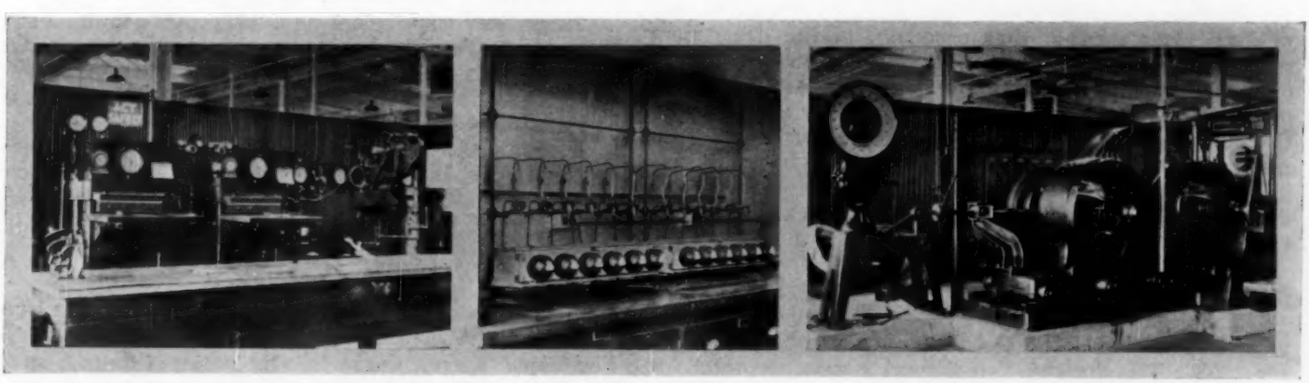
Upper: De Khotinsky Constant Temperature Ovens and Emerson Conditioning Ovens for Moisture Determinations

Lower: View of Corner of Chemical Laboratory

for the weighing out of the materials under test. It is equipped with a delicate torsion balance and is well stocked with standard approved materials. Small batches are mixed on two 6x12 inch laboratory mills made by the Vaughn Machinery Company. This laboratory also mixes small batches which are later used in the production department which cannot be successfully mixed on the large 84 inch mills due to the small demand.

A cement mixing device for the making of one gallon batches of cement has a capacity of four units. Here also is prepared experimental cements as well as factory cements of small volume.

At the end of the small line is found a three roll laboratory calender size 6x14 inches also made by Vaughn. The other equipment of the preparation laboratory consists of two 24" platen presses for curing samples and testing, and a vertical pot heater for open steam curing. These steam curing units are equipped with Tagliabue automatic temperature control appliances. A telechrone is conveniently



Platen Presses and Pot Heaters in Preparation Laboratory

Extracting Apparatus

Sprague Dynamometer with Toledo Scale for Testing Finished Tires

located above the operators' position for determining the time element.

There is also located in the preparation laboratory a conditioning cabinet for the proper conditioning of all raw batch stock. The temperature is controlled electrically at 82° F. and 45% relative humidity as suggested by the Physical Testing Committee of the American Chemical Society.

Physical Testing Laboratory

In the physical testing room all the final tests are made from the raw fabric through the compounded raw materials to the finished tire. A reeling machine measures the cord before weighing on a delicate balance and a dial gauge of constant pressure indicates the cord diameter. A Suter machine is available, breaking down the ply-up for determining construction features such as twist. An Emerson conditioning oven takes care of moisture determinations, while a cord conditioning cabinet with control temperature and humidity prepares the cord for the tensile machine.

A Scott autographic fabric tester, as well as an up-to-date rubber tester, are essential installations in the physical testing room. The fabric tester is calibrated daily and the rubber tester weekly. Both machines are autographic and the rubber tester is equipped with an electric recording device for the determination of stress strain data. All the equipment in this laboratory is of the latest type and the operations conducted according to rigid specifications.

In connection with the physical testing room, there is also found the necessary equipment for testing the finished product. A system for determining the strength of finished beads is provided by placing the tire on a special heavily constructed rim and inflating with water until ruptured. There is also found a drop testing machine for determining the resistance of a tire to stone bruising on the road.

The Sprague tire testing machine is in operation 24 hours per day for determining the quality of the finished tire carcass. Here is to be found the most severe tire testing machinery available. A large wheel 1/300th of a mile in circumference and carrying one inch cleats set 45° to the right, 45° to the left, and straight across, and equally spaced around the wheel produces a terrific pounding in the tire. The large cleated wheel drives the tire which in turn operates a generator. A Bell crank furnishes an overload and the tire is underinflated. After this rigorous machine testing the tire is dissected for examination to determine the nature of the breakdown in the carcass.

Mill Room Control Laboratory

In order to maintain a rigid control of factory operations and furnish quick releases on all mixed stock, a small laboratory is maintained in the mill room of the factory. This laboratory establishes a permanent supervision over all mixed stock to determine if the correct ingredients have been compiled in the batches. Every batch of stock is tested for cure and specific gravity and released within twenty minutes after mixing, thus speeding up the department operations and avoiding delays. In addition to checking the cure and gravity this laboratory also makes a record of temperatures of Banbury mixed stock. They use a regular thermometer and do not depend on the recording thermometer with which the Banbury is equipped. In reality this laboratory is an added insurance policy for keeping any defective materials or improperly mixed stock from going to the production departments.

THE production of gasoline in the United States during 1929 showed a large increase over the previous year, totalling 434,241,000 barrels as against 376,945,000 for 1928. The demand also showed a gain, the total for 1929 being 371,852,000 barrels as compared with 328,489,000 barrels in 1928, or a daily average demand of 1,019,000 barrels throughout 1929, against 898,000 barrels in 1928.

Mechanical Goods Exports Gain in 1929

UNITED STATES exports of mechanical rubber goods, like tires and rubber footwear, reached new heights in 1929, with a value of $8,251,624, or 14 per cent more than in 1928, according to reports of the Department of Commerce. In spite of the decided drop in the market price of crude rubber during 1929, the average unit value of all items was maintained remarkably well. In no instance was the decline more than 3 cents, as compared with the previous year. The greatly increasing exports of rubber hose which has been apparent in recent years finally relegated rubber belting, once the leading item of the mechanical rubber-goods group, to second place.

Exports of Mechanical Rubber Goods

Item	1928 Quantity	1928 Value	1928 Unit Value	1929 Quantity	1929 Value	1929 Unit Value
	Pounds			*Pounds*		
Rubber belting	4,887,206	$2,785,238	$0.57	5,741,078	$3,107,590	$0.54
Rubber hose..	7,271,821	2,610,533	.36	9,808,872	3,272,731	.33
Rubber packing	2,628,741	1,213,010	.46	2,678,444	1,217,790	.45
Rubber and friction tape	1,589,736	483,398	.30	1,827,587	521,802	.29
Total	16,377,504	$7,101,179	....	20,055,981	$8,119,913	....
Shipments to Alaska	279,356	124,084	....	296,417	131,711	....
Grand total.	16,656,860	$7,225,263	....	20,352,398	$8,251,624	....

Exports of rubber belting during 1929 increased by 17 per cent in volume and 12 per cent in value, as compared with the previous year. Nine countries took more than 200,000 pounds each, as compared to 8 during 1928. Whereas Europe was once the United States' best marketing area for this class of goods, in recent years there has been a shifting toward southern markets. The tendency was more pronounced during 1929, as was brought out by the fact that Chile, Mexico, Brazil and Argentina were among the first nine markets.

Chile, the leading market in 1927 but third in 1928, again became the most important outlet during 1929 for rubber belting, with 520,441 pounds. Mexico, taking 460,099 pounds in 1929, went from third to second place, while Brazil, taking 450,359 pounds, advanced from sixth to third place.

The Union of South Africa in former years was the United States' most potential market but has been declining in recent years, owing to domestic competition.

United States exports of rubber hose during 1929 advanced by 35 per cent in volume and 25 per cent in value, as compared with 1928. A study of the principal markets indicates that the United States sells best in such countries as the United Kingdom, Canada, France, Belgium, Japan —all of which have well developed domestic industries.

Exports of rubber packing during 1929 showed a slight increase in volume and value over the previous year. Canada was again the United States' best market, taking 762,036 pounds, followed by Mexico with 248,306 pounds and Japan with 145,830 pounds.

Exports of rubber and friction tape in 1929 increased by 15 per cent in volume and 8 per cent in value, as compared with 1928. The United Kingdom took 624,586 pounds, or 35 per cent of the total exports.

A Correction

In an article published in the February 25 issue of THE RUBBER AGE, entitled "A Forecast of the Tire Industry During the Next Five Years," an error was made in the caption of the table on page 540 reading, "Forecast of Automobile Production in the U. S." This should have read, "Forecast of Automobile Registrations in the U. S."

Akron Rubber Group, Discusses Various Phases of Manufacture

Dissects H. C. Young's Paper on Mechanical Aspects of Rubber and Future Possibilities in Improving Methods of Fabrication

AT THE recent meeting of the Akron Group, Rubber Division, A. C. S., held on February 17, a paper, written by H. C. Young, works director of the Dunlop Rubber Company, Ltd., Chas. MacIntosh & Company branch, was presented by R. D. Evans, head of the physical research department of the Goodyear Tire and Rubber Company, and was followed by a discussion on the part of a number of the members of the Akron Group. The following summary of Mr. Young's paper with abstracts of the discussion has been prepared by V. L. Smithers.

MR. YOUNG raised the question as to whether the single or multi-story factory building had the greater advantage, pointing out that general practice in England was the single story type while in America the multi-story building was favored, due to increased land values.

The paper brought out the fact that the ordinary thermometer inadequately expressed the atmospheric conditions in the office and workshop. It was recommended that the Kata Thermometer be used. A table of comparative figures was shown indicating good and bad working conditions in both workshop and office.

On the matter of power consumption, the paper dwelt at some length. The author charged that much power was lost in the ordinary plant through antiquated bearings and gearing, whereas by modern roller and ball bearings and more care in power transmission, much of this loss could be eliminated.

The following table of ratio of man power to horsepower in various industries was given:

Rubber Reclaim Factory	5.1
Cotton Mill	4.2
Chemical Works	2.8
General Rubber Factory	1.02
Electrical Mfgrs. Motor & Electrical Plant	1.0
Without test bed	.75
Automobile Mfgrs.	.45
Boot Trade	.44

The need for better control of mixing and stock working temperatures was stressed. The advantage of the internal mixer over the two roll mixer was mentioned. Also mention was made of the improvement obtained by using spray cooling instead of circulating water. It was suggested that mills be equipped with hydraulic bushes equipped with gauges to indicate stock plasticity during the mixing and thus indirectly give a measure of the heating of the stock.

The ordinary extruder or tuber was condemned as being wholly unscientifically designed to meet the demands placed upon it.

Mr. Young marveled that the calender man could produce such accurately gauged materials with such a machine so crudely designed as the ordinary calender. He charged that better temperature control could be had if less metal thickness was used in the rolls and suggested that rollers or ball bearings be used.

Mr. Young further brought out that because of our crudely designed machines, rubber was not being exploited in fields where it might easily replace other materials if more thought were given to efficient machines. Mention was made of a machine for manufacturing inlaid linoleum with various colored stocks. Such a machine cost the linoleum industry about $250,000 to develop but places linoleum manufacturers in a position to keep less efficient branches of industry from entering the field.

The paper made a general comparison of the rubber industry with other branches of manufacturing. It dwelt briefly on the possibilities of economies in the use of power and finally concluded with the opinion that the greatest need of the industry was for men of courage who could think and act without being influenced too much by what has preceded in the industry.

Discussion

Horse Power vs. Man Power

R. R. JONES and H. K. JENNINGS, *Firestone Tire & Rubber Company*

American manufacturers do not feel that these horsepower units are running wild. We believe that the more horsepower we can use per man power, the greater amount of production we can get out per man or per dollar; that the more power we use, the cheaper we will obtain it and the more cheap power utilized per man, the more we can afford to pay the man power in wages; that the more we pay him in wages, the more he can buy, or in less involved words, the prosperity of our country depends on the use of a large ratio of horsepower to man power.

While we have no figures on production per man power in an English rubber plant, we do have the figures in Mr. Young's paper on power consumed per man hour. The nearest approach to American figures is given in his requirements for a rubber reclaiming factory, which, by the way, uses more power per man than any industry he has cited—5.1 horsepower per man hour. A modern rubber reclaiming plant in the United States would not take less than 7.4 horsepower per man hour.

Referring now to his figures on a general rubber factory (1.02 horsepower per man hour) and comparing this with a modern American conveyor equipped tire plant, we find that the tire plant uses 10.7 horsepower hours per man hour, nearly ten times as much as his figure. It would be interesting to know how many pounds of production per man hour that the plant cited by Mr. Young produces.

We note that he cites a figure of 0.45 horsepower per man hour in an automobile factory in England and we might compare this with a modern American machine shop, which uses 1.4 horsepower per man hour.

That this higher hourly wage of the man power is being used to increase the comforts of the workmen may be shown by again comparing power figures, this time the amount used per capita for domestic purposes. From figures published by the National Electric

Light Association, the amount of power per capita per annum in England and Scotland together is about 120 kilowatt hours. In England alone the figure is about 200. Throughout the United States the average is about 500—this is purchased power. The amount used in Akron is about 650 kilowatt hours per year—over five times that of England and Scotland together, over three times that of England alone and twenty percent higher than the average for the United States.

We believe a proper formula with which to close this discussion is—cheap power plus a high ratio of horsepower hours to man power hours equals high production at low production cost; and high production per man at low production cost equals high hourly wages; and that a prediction might well be based on this formula. That an increased ratio between horsepower hours and man power hours will mean an increased return in money to both manufacturers and wage earners wherever they may be located.

J. Grotzinger, *Goodyear Tire and Rubber Company*

I took occasion to check the figures presented by the author on ratios of horsepower hours to manpower hours applying to various industries and specifically to a rubber mill, reclaiming plant and textile mill. I am tabulating below the author's figures as against approximate values in effect in the American rubber industry:

	By author	By writer
(1) General rubber mill.....	1.02	Approx. 2.5
(2) Rubber reclaiming plant....	5.1	30 to 40
(3) Cotton mill	4.2	4.5 to 5

As is to be expected our value does not vary much for the cotton mill, since the textile industry is old and pretty well standardized. Our ratios for the rubber mill and reclaiming plant, however, materially differ from the author's and are in line with the generally known fact that the American industry is using motor power to a much larger extent than the industry of England or continental Europe.

Tubing Machines

E. E. Davison, *The B. F. Goodrich Company*

Claiming extruders are the most inefficient and least understood piece of equipment in any rubber factory, may have been more or less true five or ten years ago, and is no doubt true in some factories today. Years ago they were commonly referred to as very similar to sausage stuffers and generally treated with about the same attention. In addition to this there was, at the time, only one manufacturer of extruders (John Royle & Sons, Paterson, N. J.) making a high grade machine. Today there are several companies not only making good extruders, but all are endeavoring to improve them and these machines are being operated in rubber factories much more efficiently than in the past.

With the proper feed screw a machine can be operated successfully using cold batched stock without the use of warming mill. This feed screw should have narrow, shallow flutes—and three or four leads. The stock is warmed sufficiently passing through the machine by increased frictional contact against feed screw and cylinder. Much better results are obtained both in uniformity of product, and production speed, if the machine is only used as a former, having the stock warmed on mill to proper consistency.

FEED BOX ON HOPPER—If the feed box is too narrow, the machine is difficult to feed. However, it can also be too wide. The trouble in this is caused by stock which, after making one revolution of the screw, comes back into the feed box from the bottom and pushes back the stock that is in the box ready to enter the flutes.

FLUTES—A varying pitch slightly narrowing towards front, maintaining the same depth gives best results. They should have a polished finish. If there are any rough spots or depressions in the flutes, they will allow stock to collect and burn. This burned spot of stock gradually gets larger, semi-cured pieces will tear from it coming out in the product, and eventually the burned spot of stock becomes so large it retards production of machine. The screw must then be taken out of machine and this burned stock removed.

ROLLER FEED—The writer has seen roller feeds operated in Germany, France and England and they are all better than hand feeding. The Farrel-Birmingham Co., Ansonia, Conn., are making an excellent machine with roller feed. Roller feeds have three advantages over hand feeding:

1. A hand feeder may become efficient in a week or so but on some stocks it is next to impossible to hand feed with any degree of efficiency. It requires no experience to put stock in a roller feed machine.
2. Lack of uniformity is largely caused by poor hand feeding. Roller feeds give uniform pressure in the head at all times if sufficient stock is kept in the feed box to allow a rolling bank.
3. Roller feeds produce from five to fifteen percent greater production than hand feeding. The greatest benefit with roller feeds is on hard, dry stocks with low rubber content, as these are very difficult to feed by hand.

HEADS—To get the best results the proper size chamber in the head is governed by the size of article produced. For very small articles, to eliminate liability of stock scorching, there should be the least amount of stock possible between the end of the screw and the die opening, having the inside taper of the head start directly at the end of the screw to the back of the die. On a large article from this same machine the head should be longer and larger inside, to allow a large volume of stock back of the die. If there is not a sufficient volume of stock back of the die when running large articles, the stock will be wavy caused by the revolutions of the screw.

DIES—The proper length band or inside straight face on the die is governed by consistency of stock. Generally the lower grade stock is more readily made smooth by a short band on the die, and on a high grade or spongy stock a long band gives best results. On articles of varying shapes with both heavy and light gauge sections the die should be given a greater lead or cut out in the back of the die at the light section in order to eliminate the drag and increase the inside drive at this point.

TEMPERATURES—On larger articles where practically all of the stock in the head is moving at all times, higher temperatures can be used than on a small article where stock in the head moves very slowly. The best results are obtained with a cooled feed screw, cooled cylinder, warm head, and high temperature at the die opening.

STOCKS—The best production conditions are obtained with a soft dense stock. High grade, nervy or spongy stocks do not flow as easily as soft dead stocks.

SPEEDS—Speeds are also regulated by stock conditions and sizes produced. The largest machine possible at slower speeds always gives best results. If a production speed of 60 ft. per min. were needed on a certain article, this could be obtained at 65 or 75 R. P. M. on a 4½" screw, but no doubt trouble would be encountered with scorched stock due to the high speed. The 60 ft. per min. could be obtained on a 6" screw machine at 40 to 45 R. P. M. and no trouble would be had from scorching, due to the slower speed.

Mill Cooling

Roy W. Brown, *Firestone Tire & Rubber Company*

The virtues of thin walled steel rolls and refrigerated water has been extolled at length. Yet not in a single instance to my knowledge have either provided satisfactory results at low cost. Cooling is a problem of maintaining a predetermined product temperature and of removing most heat units per dollar. In Akron, with typical mill practices, one million BTU's removed will cost approximately twenty cents with 90° cooling water, twenty-five cents with 60° water and fifty-seven cents with 40° water. Hence the problem becomes "How can the necessary number of heat units be removed with 90° water?".

Engineering literature tells us among other things that heat transfer is a function of the temperature gradient and that the major temperature difference occurs between the water and the roll and between the roll and the stock rather than in the metal of the roll, even though it is 4½" thick. It is noted that relative velocity greatly affects heat transfer, also that area has an influence.

During the past summer these well known principles were so applied as to remove the heat units necessary for optimum cooling with 90° water thereby effecting an appreciable savings.

To date the maximum size batch has been determined largely by the diameter of the rolls which in turn are governed by the physical limitations of the attendant. If mechanical knives, roll back and roll off devices as well as conveyors for placing the material on mills, become available the roll diameter will be limited only by mechanical considerations. Increased roll size will provide greater cooling surface and permit the use of very high temperature cooling

water. The production per mill will, in all probability, remain nearly constant although larger batch sizes may be used.

From time to time numerous ingenuous roll constructions have appeared and failed on account of high first cost, service troubles and slight if any improvement in ability to remove heat from the stock. Among these may be found rolls with spiral water pipes cast integral and cast rolls having spiral grooves turned on their outer surface after which a steel tube is shrunk onto the roll. All show a striking lack of appreciation by the designers for the thermal conductivity properties of cast iron.

H. A. DAVIS, *Goodyear Tire & Rubber Company*

The problem of cooling mixing mills is a broad one and is influenced by many more or less indefinite factors. We are accustomed to think of roll temperatures as being a function of cooling water temperature only, but other factors such as gauge of rolls, room temperatures, manner of mixing, etc., complicate the matter to a great extent.

Conclusions on the problem of mill cooling may best be drawn from tests in which the influencing factors are kept as nearly constant as possible. Tests made in just this way have demonstrated many outstanding facts. Perhaps the most important of those facts dealing with cooling in general is that two batches, alike in physical properties and weight, when mixed under the same condition appear to generate within themselves a definite quantity of heat. If this heat is not removed the temperature will rise until the stock may reach the temperature at which it burns.

It has been found that the range of cooling water temperatures with which mixing may be successfully carried out is rather wide. In other words the temperature of the water may be raised if the quantity is increased to compensate for the lower rate of heat transmission. There is, of course, an upper limit in water temperature at which the heat transmission is so slow as to make mixing dangerous.

The upper limit of cooling water temperatures, and we might also say the temperature at which stocks are likely to burn, is dependent upon the particular stock in question. A given temperature cooling water may be used successfully with certain stocks and yet its use might be suicidal with a more delicate stock.

It has been our experience that while the success of mill cooling is of course closely related to cooling water temperature, the other angles of the problem, rate of flow of water, gauge of rolls, thickness of the rolls, reliability of the mill operator, etc., cannot be overlooked.

Anti-Friction Bearings

A. P. REGAL, *Philadelphia Rubber Works*

It is surprising to me that anti-friction bearings have not yet been applied to mill line shafting and to roll journals. Mr. Young points out that the friction losses under load with sleeve bearings, amounts to half of the power input, or 400 H. P. on an 800 H. P. load. If anti-friction bearings reduce this to the 5% he states would be the result, 360 H. P. would be saved, or 162,000 K. W. hours, on a 600-hour month, amounting at 1c, to $1,620.00 on one such drive alone. Less cooling water would be required, and a higher temperature be adequate. Maintenance and oiling would likewise be greatly reduced. A smaller motor being sufficient, its lower cost would partially offset the greater cost of anti-friction bearings. It seems that both bearing manufacturers and rubber factory operators, are overlooking a chance for big savings.

A 3500 gallon per minute, direct-connected Centrifugal pump, both pump and 250 H. P. motor being ball bearing, has already in the two years it has been running, demonstrated the value of anti-friction bearings. Wearing rings have been changed once in this period, where, with a similar unit sleeve-bearing equipped, these rings have required changing every few months. Vibration has also been markedly greater than with the ball-bearing unit.

J. GROTZINGER, *Goodyear Tire & Rubber Company*

An interesting point that Mr. Young brings up is the matter of power savings possible in the operation of rubber mills by the application of anti-friction bearings. The figures he mentions would seem to indicate that our friction losses are tremendous and the possible saving equally important. We cannot agree with his viewpoint as actual tests demonstrate that the possible savings, although worthwhile, require an investment in bearings so great that the proposition is not attractive. I might say that the idle load of a line of eight 84" mills, not including the motor, is approximately 45 kilowatts where the mills are equipped with the standard type of bronze bearings. By substituting anti-friction bearings the friction loss, when running idle, is reduced to 15 kilowatts. In other words the idle friction is reduced to one-third. It would be interesting to know what the friction loss would be on a line of loaded mills and would appreciate to hear of the experience of others on this point.

Roller Bearings

W. H. WELCH, *Goodyear Tire & Rubber Company*

A test run was made to determine the power saving on mills equipped with roller bearings as against that on mills equipped with plain bronze bearings. This run was made on breakdown mills. The greatest saving in power occurred at the peak load when a new batch of rubber was put into the mills. The average savings in power was found to be rather low. This can be accounted for by the fact that the peak load is of very short duration.

A greater saving would no doubt be shown on refiners as they operate on full load practically all of the time.

Multiple vs. Single Story Factories

W. E. WATERS, *Goodyear Tire & Rubber Company*

In determining whether to use multiple or single story type of construction for rubber plants the most important item is the value of the land on which the building is to be constructed. If the land is cheap a one story building would probably be the most economical, but if the land is expensive it would undoubtedly be more economical to use multiple story construction. The unit cost of constructing a single story sawtooth or monitor type building would be slightly higher than that of a multiple story building. In some cases this difference may be sufficient to more than offset any saving made on the cost of the land. Each type of construction has advantages and disadvantages when compared with the other.

Single story construction eliminates the need of elevators and if the plant is properly laid out, inside transportation is much more easily handled than in multiple story buildings.

Illumination of a building is greatly simplified in the one story sawtooth or monitor type due to the fact that it is possible to get almost 100% of the illumination through the roof. In the multiple type building the only daylight you are able to obtain is that which comes through the side wall sash. Ventilation is also more easily handled in a one story building than in a multiple story building, however, this will be offset somewhat by the fact that more steam is necessary in the heating of a one story building due to the fact that more surface is exposed to the weather. Heavy machinery installations are more easily handled in a one story building since it is not necessary to reinforce columns and beams in order to carry the load. Foundations and pits for this machinery can be installed more easily and at a lower cost. Another item of major importance is the fact that mill and calender installations above the ground floor cause considerable vibration. Foundations for mill and calender installations on the ground floor are separate and practically all vibration can be eliminated.

Each type of building has its own merits, and in making a decision the first cost and the cost of carrying on operations after completion should be determined.

Ventilation

H. H. BAIRD, *Goodyear Tire & Rubber Company*

The particular point to be stressed in Mr. Young's paper pertaining to ventilation is that temperature alone is not a true indicator of what should produce human comfort. A person can be compared to a boiler in that they consume food as fuel and generate body heat. If this heat is absorbed by our surroundings faster than it is generated we are uncomfortably cool or cold, but if the heat is absorbed slower than it is liberated we are uncomfortably warm or hot, depending upon the degree of difference between its generation and absorption.

The Kata thermometer referred to tells its story like a human being, only with more accuracy in that at mean body temperatures certain air conditions involving temperatures, humidity and air movement permit certain rate of cooling, and when the rate of generation practically equals that of absorption, body comfort results.

Tire Industry Declines While Footwear Gains

Rubber Boot and Shoe Output at Peak in Last Quarter of 1929, But Tire Factories Show Effects of Financial Depression

WHILE the tire and tube industry dropped to the lowest level in years, the rubber footwear, mechanical goods and miscellaneous rubber products businesses continued through the last quarter of 1929 at an unusually high rate, according to the recently issued statistical report of the Rubber Manufacturers Association. The rate of crude rubber consumption in tire factories was the lowest of any three-month period in the last two years and the sales value of shipments was lower than for any similar period in the last seven years.

The actual value of all shipments of manufactured rubber products during the period totaled $233,713,000, as compared with $326,292,000 in the third quarter of 1929 and with $269,010,000 in the fourth quarter of 1928. Tires, tubes and tire repair materials, as usual, comprised the greater part of the total sales value of all rubber goods, despite their lessened volume. The value of these items alone reached a figure of $135,871,000, as against $97,842,000 for all other rubber products combined. In the final quarter of 1929, however, tires and tire accessories represented only 58.1 per cent of the total sales value of all rubber goods shipments, as compared with 68.3 per cent in the preceding quarter.

In amount of crude rubber used, tires, tubes and tire repair materials absorbed 66,939 long tons out of a total of 84,872 long tons consumed by the entire industry in the fourth quarter. Rubber consumption in the tire industry continued its sharp decline from its second quarter absorption of 120,726 long tons and its third quarter absorption of 94,630 long tons. The rubber boot and shoe industry, on the other hand, showed greater rubber consumption and shipment value than ever before in its history, and other miscellaneous divisions of the rubber manufacturing trade continued strong.

According to the association figures, reclaimed rubber consumption in October, November and December was 45,645 long tons and production 42,618 long tons. These figures show a sharp decline from the third quarter report of 56,963 long tons consumed and 58,040 long tons produced.

From its quarterly questionnaire report, the association estimates stocks of crude rubber on hand in the United States at the end of the year as 108,547 long tons. In a previous monthly report it had figured stocks as of December 31st at 105,138 long tons.

The figures presented in the table below are estimated by the Rubber Manufacturers Association to represent 92 per cent of the American manufacturing industry, but those quoted in this article have been raised so as to represent 100 per cent of the domestic industry.

Comparative Table of Value of Rubber Goods Shipments from Manufacturing Plants and the Amount of Crude Rubber Consumed for the Last Five Quarters

Total Sales Value of Manufactured Rubber Products Shipped

Thousands (,000) omitted

	Product	4Q-29	3Q-29	2Q-29	1Q-29	4Q-28
	Tires and Tire Sundries					
1	Auto and Truck Casings	$102,267	169,903	165,571	141,240	128,521
2	Auto and Truck Tubes	14,758	23,604	24,011	20,558	18,480
3	Motorcycle Casings and Tubes	199	405	426	318	334
4	Bicycle Casings and Tubes	631	877	785	584	867
5	Aeroplane Casings and Tubes	63	100	144	147	76
6	Solid and Cushion Tires	3,149	4,752	5,049	4,253	4,862
7	All other Solid Tires	320	721	747	577	292
8	Tire Sundries and Repair Materials	3,614	4,737	4,141	4,376	5,283
TOTAL	Tires and Tire Sundries	$125,001	205,099	200,874	172,053	158,715
	Other Rubber Products					
9	Mechanical Rubber Goods	$ 23,200	28,234	30,926	28,835	23,629
10	Boots and Shoes	36,301	31,265	22,303	20,986	29,595
11	Insulated Wire and Insulating Compounds	8,230	8,963	7,734	8,199	11,384
12	Druggist Sundries, Medical and Surgical Rubber Goods	1,545	2,409	1,957	2,230	2,133
13	Stationers' Rubber Goods	601	631	646	682	645
14	Bathing Apparel	234	503	1,597	653	167
15	Rubber Clothing	2,610	2,696	1,868	1,362	2,559
16	Automobile Fabric	1,892	3,267	3,021	2,447	1,629
17	Other Rubberized Fabrics	2,904	2,751	2,099	1,739	3,249
18	Hard Rubber Goods	1,679	1,889	1,640	1,587	2,329
19	Heels and Soles	5,792	6,298	5,895	5,774	5,690
20	Rubber Flooring	1,189	1,366	1,137	892	1,268
21	Sporting Goods, Toys and Novelties	1,356	2,002	2,676	1,578	1,421
22	Miscellaneous, not included in any of above items	2,482	2,815	3,461	3,109	3,076
TOTAL	Other Rubber Products	$ 90,015	95,090	86,960	80,073	88,774
GRAND TOTAL	All Products	$215,016	300,189	287,834	252,126	247,489

Crude Rubber Consumed—Long Tons

	Product	4Q-29	3Q-29	2Q-29	1Q-29	4Q-28
	Tires and Tire Sundries					
1	Auto and Truck Casings	48,244	69,220	89,261	82,393	75,189
2	Auto and Truck Tubes	10,096	13,813	17,038	15,736	12,961
3	Motorcycle Casings and Tubes	47	61	87	64	57
4	Bicycle Casings and Tubes	401	349	279	248	228
5	Aeroplane Casings and Tubes	25	66	60	27	21
6	Solid and Cushion Tires	1,873	2,175	2,733	2,209	2,879
7	All other Solid Tires	106	224	293	182	63
8	Tire Sundries and Repair Materials	792	1,152	1,317	1,232	1,574
TOTAL	Tires and Tire Sundries	61,584	87,060	111,068	102,091	92,972
	Other Rubber Products					
9	Mechanical Rubber Goods	4,692	5,785	6,022	5,783	4,501
10	Boots and Shoes	5,534	4,873	4,740	3,827	4,631
11	Insulated Wire and Insulating Compounds	1,050	976	717	1,071	997
12	Druggist Sundries, Medical and Surgical Rubber Goods	469	545	487	537	472
13	Stationers' Rubber Goods	280	316	375	355	324
14	Bathing Apparel	155	103	223	284	140
15	Rubber Clothing	356	471	369	283	344
16	Automobile Fabrics	252	342	365	318	209
17	Other Rubberized Fabrics	681	709	512	452	777
18	Hard Rubber Goods	236	381	317	339	193
19	Heels and Soles	1,677	1,635	1,471	1,535	1,299
20	Rubber Flooring	282	285	298	257	292
21	Sporting Goods, Toys and Novelties	362	344	430	429	307
22	Miscellaneous, not included in any of above Items	472	821	755	719	731
TOTAL	Other Rubber Products	16,498	17,586	17,081	16,189	15,217
GRAND TOTAL	All Products	78,082	104,646	128,149	118,280	108,189

Accelerators *of* Vulcanization *and* Their Uses*

By FRIEDRICH EMDEN

IN view of the importance which is accorded to organic accelerators in modern compounding, a detailed review of the present state of vulcanization with accelerators should be of interest, especially as a number of accelerators with notable properties have appeared on the market in recent years. With regard to previous work on this subject, the author's earlier paper[1] may be cited, as it also presents the most important historical data regarding the discovery of the acceleration of vulcanization.

The nature of the acceleration of vulcanization has not thus far been fully explained. The polysulfide theory of Bedford and Scott and the orthothiozonate theory of Feuchter are still the most outstanding attempts to explain its mechanism. Both theories have too little experimental support, and only further researches can gradually throw light on the complicated processes which here play a part. A contribution in this direction is afforded by the work of Hardman and White[2], entitled "Some Characteristic Properties of Accelerators as Evidenced by the Coefficients of Vulcanization." The observation that, in certain compounds activated by powerful accelerators, the speed of vulcanization, though at first very great, rapidly decreases during the cure lead to the conclusion that many accelerators are destroyed during the process of vulcanization. There are accelerators which decompose so quickly at high curing temperatures that their power of acceleration is generally not fully effective. On the basis of their experiments the authors divide accelerators into three groups. The first group includes those accelerators which are stable during vulcanization, as for example, hexamethylenetetramine and triphenylguanidine. The curve showing the combination with sulfur in such cases indicates a straight-line increase. The second group is composed of accelerators which either are fugitive or are easily decomposed during vulcanization. The curve showing the combination with sulfur soon falls off, becoming parallel to the time axis—in other words the union with sulfur ceases. Examples of this group are the xanthogenates. Their accelerating action at first is very marked but it soon vanishes. The third group consists of the semi-permanent accelerators. The curve showing the union with sulfur falls off gradually toward the time axis without, however, becoming parallel to it; in other words the activity of these accelerators diminishes continually during vulcanization, yet does not disappear completely. In this group are accelerators which show a uniform decrease in accelerating power, as for example diphenylguanidine, that is, the accelerating power at first falls off more markedly than toward the close of vulcanization. Even accelerators which are closely related differ in this loss of activity; for example, tetramethylthiuramdisulfide loses its activity quicker than the corresponding monosulfide. The work cited is not only of scientific but of technical importance and gives some idea how complicated the reactions occurring in vulcanization are, and how peculiar to each accelerator. In fact these are no purely catalytic reactions which occur, for the accelerators are consumed more or less quickly during the course of vulcanization. The fact that this consumption of accelerator is even dependent on the nature and quantity of certain compounding ingredients has been shown by the work of Wistinghausen[3], published a short time ago.

While a return to scientific work on accelerators in recent years can be clearly noted, the number of patent notices is still more significant. However, in view of the magnitude thereof, a review of the patent literature on accelerators cannot be included in this article, especially as such reviews have already been published elsewhere.[4 5]

The manufacture of accelerators has, during the last ten years, gradually grown to be a very important department of chemical industry. They are not only manufactured in Germany but elsewhere, especially in the United States and England. In the following résumé, an attempt has been made to include all accelerators made in these countries, and to indicate their most advantageous use. To facilitate classification a short alphabetical list of all the accelerators will first be given. Besides the trade-name, the chemical constitution, and the name of the maker, there is given a number by the help of which it will be possible to locate a given accelerator in the detailed résumé which is to follow.

No.	Trade name	Made by[6]	Chemical Constitution
1.	A 1	R. S. L.	Thiocarbanilide
7.	A 5—10	R. S. L.	Formaldehyde-aniline
9.	A 7	R. S. L.	Condensation product of acetaldehyde and ethylidene-aniline
10.	A 11	R. S. L.	Condensation product of formaldehyde and a Schiff base
11.	A 16	R. S. L.	Condensation product of an aldehyde and a Schiff base
6.	A 17	R. S. L.	Methylene-*p*-toluidine
13.	A 19	R. S. L.	Condensation product of formaldehyde and a Schiff base
14.	A 20	R. S. L.	Aldehyde-amine diluted with mineral oil
2.	A 22	R. S. L.	Di-*o*-tolylthiourea
15.	A 32	R. S. L.	Condensation product of an aldehyde with a Schiff base
16.	A 50	R. S. L.	Aldehyde-amine
68.	Accelerene	B. D.	*p*-Nitrosodimethylaniline
45.	Aero-X	Am. Cyan.	Aniline-di-isopropyldithiophosphate
6.	Akbar	P. D. C.	Anhydroformaldehyde-*p*-toluidine
4.	Aldehyde-ammonia	R. H.	Acetaldehyde-ammonia
1.	Anchoraccel	A. C.	Thiocarbanilide
17.	B B	B. F. G.	Butyraldehyde-*p*-aminodimethylaniline
64.	Captax	R. T. V.	1-mercaptobenzothiazole
18.	Crylene (hard)	N. C.	Aldehyde-amine
19.	Crylene (paste)	N. C.	Aldehyde-amine + stearic acid
69.	Chinoidin	A. B. N. K.	Mixture of various alkaloids of Peruvian bark

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No.	Trade name	Made by[6]	Chemical Constitution
39.	D. O. T. G.	du P.	Di-*o*-tolylguanidine
2.	D. O. T. T.	R. H.	Di-*o*-tolylthiourea
40.	D. P. G.	Am. Cyan.	Diphenylguanidine
		D. C.	
		R. S. L.	
20.	E-A	R. H.	Ethylidene-aniline
5.	F-A (high m.p.)	R. H.	Formaldehyde-aniline
8.	F-A (low m.p.)	R. H.	Methylenedianilide
21.	Furfuramide	N. C.	Aldehyde-amine
5.	Formaniline	du P.	Anhydroformaldehyde-aniline
3.	Grasselerator 102	G. C.	Hexamethylenetetramine
22.	Grasselerator 808	G. C.	Aldehyde-amine
23.	Grasselerator 833	G. C.	Aldehyde-amine
46.	Grasselerator 552	G. C.	Piperidinepentamethylene-dithiocarbarmic acid
25.	Heptene	N. C.	Heptaldehyde-aniline, diluted with mineral oil
24.	Heptene-base	N. C.	Heptaldehyde-aniline
3.	Hexa	R. H.	Hexamethylenetetramine
52.	Lithex	N. C.	Lead dithiobenzoate
8.	Methylene-dianilide	du P.	Methylenediphenydiamine
6.	Methylene-para-toluidine	du P.	Methylene-*p*-toluidine
63.	Monex	N. C.	Tetramethylthiurammono-sulfide
1.	Nurac	made in France	Thiocarbanilide
46.	Pip-Pip	R. H.	Piperidinepentamethylene-dithiocarbamic acid
41.	P. O. T. G. Portsmouth accelerator No. 3	Am. Cyan.	Phenyl-*o*-tolylguanidine
		D. C.	
		du P.	
		P. D. C. and others	
47.	R 2	R. S. L.	Condensation product of methylenepiperidine and carbon disulfide
57.	R 3	R. S. L.	Zinc salt of a dithiocarbamic acid
50.	R 5	R. S. L.	Dithiocarbamate
26.	R & H 40	R. H.	Aldehyde-amine
59.	Safex	N. C.	Dinitrodiphenyl ester of dimethyldithiocarbamic acid
46.	Suparac Standard	M. T. D.	Piperidinepentamethylene-dithiocarbamic acid
56.	Super-Sulfur No. 1	R. T. V.	Oxidized zinc salt of dimethyldithiocarbamic acid
53.	Super-Sulfur	R. T. V.	Lead salt of dimethyldithiocarbamic acid
27.	Tensilac 39	R. H.	Aldehyde-amine
28.	Tensilac 40	R. H.	Aldehyde-amine
29.	Tensilac 41	R. H.	Aldehyde-amine
30.	Tensilac 50	R. H.	Aldehyde-amine
70.	Thermlo F	R. H.	Organic polysulfide
1.	Thiocarbanilide	du P.	Thiocarbanilide
63.	Thionex	du P.	Tetramethylthiurammono-sulfide
42.	T. P. G.	du P.	Triphenylguanidine
		R. H. and others	
32.	Trimene	N. C.	Triethyltrimethylenetriamine and stearic acid
31.	Trimene base	N. C.	Triethyltrimethylenetriamine
61.	Tuads	R. T. V.	Tetramethylthiuramdisulfide
44.	Ultracene	L. V.	Guanidine derivative
73.	Ureka	R. S. L.	————
4.	Velosan	made in France	Acetaldehyde-ammonia
33.	Vulcanex	du P.	Aldehyde-amine
66.	Vulcanol	du P.	idenedihydrothiazine
67.	Vulcapont	du P.	Thioketophenyldipropylpropyl-Equal parts Thionex and Vulcanol
34.	Vulcone	du P.	Aldehyde-amine
4.	Vulkacit A	I. G.	Acetaldehyde-ammonia
36.	Vulkacit Bp.	I. G.	A mixture of various high boiling heterocyclic bases
1.	Vulkacit Ca	I. G.	Thiocarbanilide
40.	Vulkacit D	I. G.	Diphenylguanidine
3.	Vulkacit H	I. G.	Hexamethylenetetramine
64.	Vulkacit Mercapto	I. G.	1-mercaptobenzothiazole
46.	Vulkacit P	I. G.	Piperidinepentamethylene-dithiocarbamic acid
54.	Vulkacit P extra	I. G.	Zinc salt of ethylphenyl-dithiocarbamic acid
61.	Vulkacit Thiuram	I. G.	Tetramethylthiuramdisulfide
37.	Vulkacit TR	I. G.	Mixture of polyamines of ethylene
38.	Vulkacit 470	I. G.	Condensation product of homologues of acrolein with aromatic bases
35.	Vulkacit 576	I. G.	Condensation product of homologues of acrolein with aromatic bases
48.	Vulkacit 774	I. G.	Dithiocarbamate of cyclo-hexylethylamine
43.	Vulkacit 1000	I. G.	*o*-Tolylbiguanide
68.	Vulkafor I	B. D.	*p*-Nitrosodimethylaniline
40.	Vulkafor II	B. D.	Diphenylguanidine
42.	Vulkafor III	B. D.	Triphenylguanidine
1.	Vulkafor IV	B. D.	Thiocarbanilide
4.	Vulkafor V	B. D.	Acetaldehyde-ammonia
58.	Vulkafor VI	B. D.	Zinc diethyldithiocarbamate
49.	Vulkafor VI R	B. D.	Diethylaminodiethyldithio-carbamate
62.	Vulkafor VII	B. D.	Tetraethylthiuramdisulfide
12.	Waxene	R. S. L.	Dispersion of A-16 in wax
51.	W 29	D. C.	Combination of diphenyl-guanidine and dibenzyldithio-carbamic acid
65.	W 80	D. C.	Combination of diphenylguanidine and mercaptobenzothiazole
71.	W 87	D. C.	————
72.	Z 88	R. S. L.	————
60.	Z. B. X.	N. C.	Zinc butylxanthate
55.	Zimate	R. T. V.	Oxidized zinc salt of dimethyl-dithiocarbamic acid

The above list includes 99 accelerators, many of which, however, are identical. In the systematic review which is to follow, these accelerators are classified according to their chemical constitution, so that it should be possible to classify those having similar properties in large groups. Characteristics common to a group of accelerators are given in the prefacing remarks so as to avoid repetition in the case of individual accelerators.

The most important feature of an accelerator is its activity. An attempt has been made to indicate the accelerating strength by a number, that of diphenylguanidine being taken as unity since it is the accelerator most widely used. Of course the figures given can only serve as a rough basis for comparison, as it is well known that the activity of an accelerator is greatly influenced by various factors. Accelerators may be classified according to their strengths under four headings.[7]

Type of accelerator	Accelerating power	Abbreviation	
Ultra-accelerators	very strong	U	Salts of dithio-acids. Thiuramsulfides.
Semi-ultra-accelerators	strong	S	Mercaptobenzothiazole. Some aldehyde-amines. Vulkanol.
Moderately strong accelerators	moderate	M	Disubstituted guanidines. Aldehyde-ammonia condensation products. Most aldehyde-amines.
Weak accelerators	weak	G	Trisubstituted guanidines. Formaldehyde-amines. Thioureas.

To bring out their full activity most accelerators require the addition of activators, of which zinc oxide is by far the most important. Certain lead salts such as dithionates require the presence

of litharge, which, however, has just the opposite effect with many other accelerators, destroying their activity. In very small amounts it raises the critical temperature[8]. Accelerators thus affected are dithiocarbamates, thiuramsulfides, mercaptobenzothiazole, and others.

The temperature at which an accelerator begins to be effective is generally spoken of as the critical temperature, although strictly speaking this designation is not correct. Most accelerators are active even below their "critical temperature," though only after a rather long time, be it hours, days, or even weeks. It would be more correct to speak of the length of time in minutes required to vulcanize partially a standard mix at a definite temperature, say 100° C. In the present article the conventional conception of critical temperature is retained, and the temperature indicated is that at which the accelerator in question partially cures a rubber-sulfur-zinc oxide mix.

Moreover, the critical temperature varies considerably according to the nature and quantity of the other materials used. It is lowered by increasing the percentage of accelerator, but on the other hand increasing the sulfur dosage affects it but little. A suitable method for determining the critical temperature is that of Thies[9], according to which a mixture containing zinc oxide, sulfur, and the accelerator in question is heated at various temperatures. The point at which partial vulcanization occurs is evidenced by the sample becoming insoluble in naphtha.

Accelerators vary in the effect they exercise on the aging of rubber compounds. The following list has been suggested by Dinsmore[10].

Accelerator	Antioxidant properties
Dithiocarbamates	None
Xanthates	None
Thiurams	Weak
Mercaptobenzothiazole	Good
Z 88	Weak
W 80	Weak
Vulcanol	Weak
Aldehyde-amines	Pretty weak
p-Nitrosodimethylaniline	Good
Ethylidene-aniline	Weak
Aldehyde-ammonia	None
Guanidines	None
Hexamethylenetetramine	None
Thioureas	Very weak

It is remarkable that, according to this list, only two accelerators have good antioxidant properties, namely mercaptobenzothiazole and *p*-nitrosodimethylaniline. Regarding the antioxidant properties of the other accelerators, the information available is inconsistent.

Other summaries of accelerators published are: Dinsmore and Vogt[11], "A Scheme of Accelerator Classification"; Norris[12], "Organic Accelerators." The latter was the source of considerable data used in the present article.

SYSTEMATIC REVIEW OF ACCELERATORS IN EVERYDAY USE

I. Thioureas.

To this group belongs that accelerator which has been known and used the longest, namely thiocarbanilide or diphenylthiourea. Thioureas are prepared by the condensation of carbon disulfide and aromatic amines. For example, diphenylthiourea is made by warming carbon disulfide with aniline, some sulfur being added to accelerate the reaction. Hydrogen sulfide is formed as a by-product.

Thioureas are pretty weak accelerators. In the absence of zinc oxide they are even weaker than aniline and its homologues, but in its presence they are somewhat stronger than the corresponding bases. Their activity increases on increasing the percentage of zinc oxide present and that of the accelerator itself. In compounds containing considerable zinc oxide (40-50%)[13] and several per cent (3-5%) of the accelerator, their activity is pretty strong. Such compounds have a strong tendency to scorch on mixing or during storage. Thioureas color their vulcanizates an intense yellow during vulcanization, on storage, and on exposure to sunlight, and hence are unsuitable for bright colored compounds. Lead compounds have a marked retarding effect. Thioureas are poisonous, though not as much so as aniline itself. Its unpleasant smell, similar to that of aniline, is imparted to compounds containing it and to vulcanizates made therefrom. Two to five per cent thiourea requires four to six per cent sulfur and at least 5% zinc oxide. Higher percentages of zinc oxide require the addition of large quantities of softener to prevent scorching. Because of their undesirable properties thioureas are not used today to the extent that they were formerly.

1. Al (R. S. L.), Anchoraccel (A. C.), Nurac (France), Thiocarbanilide (du P.), Vulkacit C. A. (I. G.), Vulkafor IV (B. D.), Thiocarbanilide or diphenylthiourea, specific gravity 1.30, white to pale yellow powder with slight odor, resembling that of aniline. Melting point 150-154°C. Insoluble in cold or warm water; insoluble in cold benzene and only slightly soluble in warm benzene; insoluble in naphtha; slightly soluble in cold alcohol, easily soluble in hot alcohol. Is not hygroscopic. Decomposes when incorporated on hot rolls, partly forming aniline and phenyl mustard oil, the latter irritating the mucous membranes, especially the eyes. Activity 0.5.

2. A22 (R. S. L.), Di-ortho-tolylthiourea (du P.). Di-*o*-tolylthiourea, specific gravity 1.25, white to pale yellow powder. Melting point 144 to 148°C. Behaves like thiocarbanilide in every way. Activity 0.6. Has somewhat less yellowing action on compounds after vulcanization.

II. Aldehyde-ammonia Condensation Products.

These are formed by the action of aliphatic aldehydes on ammonia. Of the numerous members of this group only the reaction products of formaldehyde and of acetaldehyde have found extensive use. Even they have been displaced in part lately by accelerators with more favorable properties.

3. Hexa (R. H.), Grasselerator 102, Vulkacit H (I. G.). Hexamethylenetetramine, sp. gr. 1.26, white, finely-divided, almost odorless powder. Hygroscopic. Very easily soluble in water and in alcohol even in the cold; slightly soluble in cold benzene, easily soluble when warmed; almost insoluble in naphtha even on warming. On heating, volatilizes without melting, decomposing to ammonia and formaldehyde. Is absolutely insoluble in rubber, and therefore, must be used in a finely divided condition. Activity about 0.8. Favorable dosage 1.0 to 1.5%. Almost without effect in the absence of zinc oxide, at least 5% ZnO being required, a higher percentage increasing the activity considerably. In compounds containing considerable zinc oxide, the addition of about 2% MgO has a favorable effect. Not less than 3% sulfur is required. Vulcanizates have an unpleasant smell, especially shortly after curing. Cases of skin irritation are observed rather often, and are overcome to some extent by employing master batches. Compounds containing "hexa" have a very high critical temperature (about 130°C). It is not suitable for compounds containing lead oxide, magnesium oxide, or magnesium carbonate, but works well with factice and antimony sulfide. When used in combination with other accelerators, it increases their activity considerably, for example, with diphenylguanidine, tetramethylthiuramdisulfide, and mercaptobenzothiazole. Mixtures of accelerators prepared in this way have marked activity and are of general utility, especially for white and colored compounds.

4. Aldehyde-ammonia (R. H.), Velosan (France), Vulkafor V (B. D.), Vulkacit A (I. G.). Acetaldehyde-ammonia, pale yellow finely divided powder with a slight odor. Melting point 70°C. Easily soluble in water, alcohol, and benzene even in the cold. Slightly soluble in cold naphtha, but fairly easily soluble in warm naphtha. Is hygroscopic, and loses its activity when stored in an open vessel. Activity 0.8. Quantity required 1.0% on the rubber, 2% for hard rubber. Presence of zinc oxide is necessary, at least 10% being required, larger amounts producing increased activity. Magnesium oxide has a retarding effect if more than 5% is present. Not suited for compounds containing litharge or factice, or for bright colored compounds. Has somewhat greater accelerating power than hexamethylenetetramine.

III. Aldehyde-amines.

Aldehyde-amines are prepared by the action of aldehydes upon aromatic or aliphatic amines, especially aniline. Thus, according to the character and the quantity of the components used, and the conditions of the reaction (temperature, catalysts), the most varied products can be obtained.

Formaldehyde and aromatic amines yield a series of relatively

weak accelerators, which are used either alone or in combination with stronger accelerators. When used alone, compounds with a high critical temperature are obtained, which cure slowly, yet require a relatively large quantity of sulfur (4 to 5%) and hence bloom. The flat trend of the vulcanization curve indicates that such compounds are especially suited for roll-covers and other articles with thick rubber layers. These condensation products of formaldehyde and aniline are more frequently used in combination with stronger accelerators, as special advantages are thereby obtained. Because of their softening action, the danger of compounds containing them scorching is lessened. The curing curve is flatter even in the case of compounds containing accelerators, which, when used alone, show no such favorable trend, as for example, the guanidines. The aging, too, is favorably influenced. The presence of zinc oxide is not unconditionally required by the formaldehyde-amines, yet their activity is thereby increased. Undesirable features of these accelerators are their odor, which is especially noticeable during mixing, and their tendency to impart a yellow color to bright colored compounds after vulcanization, especially on storage or on exposure to sunlight, due to their content of aromatic amines.

When higher homologues of formaldehyde are made to react with aromatic amines, the amount of possible reaction products is almost innumerable. Acetaldehyde alone reacts with aniline to produce a whole series of substances, which are called Schiff's bases after their discoverer Schiff. They in turn can enter into further combination with other substances, so that a whole field of investigation is presented here. The exact composition of many of the accelerators in the market of the aldehyde-amine type is unknown. They are recognized by their characteristic odor, and generally consist of fluid or viscous oils, varying in color from yellow to brown, though they often occur also as brown resins or powder. Their activity is, generally speaking, of the order of magnitude of diphenylguanidine, though semi-ultra accelerators are also found among them. They are all suited to high curing temperatures, and the danger of compounds containing them scorching is small.

These aldehyde-amines also give an especially flat curing curve, and have a favorable influence on the aging. Because of their good properties, they are generally used in moulded goods, and in compounds containing gas black and reclaim. They do not behave all alike toward different fillers, and further mention will be made of the individual accelerators in this respect. Zinx oxide is generally needed to bring out the full accelerating power, 4 to 5% being required, a higher percentage having no further effect. However, some aldehyde-amines accelerate in the absence of zinc oxide. They all give a yellow color to white compounds, which becomes more pronounced on aging and exposure to light.

5. F. A. high m.p. (R. H.), Formaniline (du P.). Anhydroformaldehydeaniline. Condensation product of one molecule of formaldehyde and one molecule of aniline. Sp. gr. 1.14. A yellowish white powder, melting point about 133°C., insoluble in water, but very easily soluble in rubber; generally contains traces of free aniline, and often formaldehyde, too. Formaldehyde-aniline itself is also somewhat volatile when mixed on hot rolls and while calendering, often irritating the lungs and eyes. If traces of formaldehyde are present, skin affections are met with in sensitive people. However, with proper handling, formaldehyde-aniline is not dangerous. On storage, it turns brown, due to the effect of atmospheric oxygen. It has a softening action on rubber, and is used principally in combination with other accelerators in order to decrease the tendency to pre-cure, and to obtain a flatter curing curve. When used alone, at least 4% of sulfur is necessary. Its activity (0.2) is only about one-fifth that of diphenylguanidine.

6. Akbar (P. D. C.), A17 (R. S. L.), Methylene-para-toluidine (du P.). Anhydroformaldehyde-*p*-toluidine. Sp. gr. 1.11. Yellow to grayish-white powder. In all respects very similar to formaldehyde-aniline, though somewhat less prone to pre-cure. Activity 0.3. Somewhat volatile when mixed on hot rolls and during calendering. The vapors irritate the mucous membranes of the eyes and lungs of sensitive people, yet it is not poisonous when properly used.

7. A5-10 (R. S. L.) Condensation product of one molecule of formaldehyde and 1½ molecules of aniline. Sp. gr. 1.11. Properties and applications same as for formaldehyde-aniline; melting point somewhat lower; softening action somewhat greater. Activity 0.2.

8. F. A. low m.p. (R. H.), Methylene-dianilide (du P.). Methylenedianilide, condensation product of one molecule of formaldehyde and two molecules of aniline. Sp. gr. 1.15. Yellowish white floury substance easily crushed. Quickly turns brown on exposure to the air. Insoluble in water, but very soluble in rubber. Melting point about 45-50°C. Has greater softening effect than formaldehyde-aniline or A5-10. On mixing and calendering the evolution of vapors irritating the mucous membranes is more pronounced than in the case of formaldehyde-aniline. Activity 0.2. To be used in the same way as formaldehyde-aniline; though it imparts a more intense brown color to compounds containing it.

9. A 7 (R. S. L.) Condensation product of acetaldehyde and ethylidene-aniline, sp. gr. 1.10. A thick brown oil, which becomes more fluid on warming. Activity 1.0. Its activity is good even in the absence of zinc oxide, but the addition of the latter has a very favorable effect. It is not suitable for white or bright colored compounds. Magnesium oxide has a marked retarding action. It should not be used in compounds containing much gas black or clay. Dosage recommended 0.5 to 1.5. For non-blooming compounds use 2.6 parts of sulfur, for blooming compounds 4.0 parts. Recommended for hard rubber compounds (dosage 2.0). Vulcanizates obtained with this accelerator are soft and have low modulus.

10. A 11 (R. S. L.) is obtained from the reaction of formaldehyde with a Schiff base. It is a brown resin, sp. gr. 1.10, melting point 80°C., activity 1.1. Is effective only in the presence of zinc oxide. Whiting, litharge, or magnesium oxide should not be present. Is especially suited for tread compounds (1.5 to 1.75 parts A 11; 3.5 to 3.8 parts sulfur), carcass and tube compounds (dosage 0.71 to 1.0) and all other black, press-cured compounds.

11. A. 16 (R. S. L.) Reaction product of an aldehyde and a Schiff base. Is a thin brown oil, one-third consisting of a high-boiling neutral oil as a diluent. Sp. gr. 1.00. Activity 1.0. Zinc oxide is necessary, but the presence of whiting, magnesium oxide, or litharge is undesirable. Gas black and clay have a slight retarding action. Accelerator dosage 0.4 to 1.5; sulfur dosage 2.5 to 4. Commonly used for all sorts of black compounds which are press-cured.

12. Waxene (R. S. L.) A dispersion of A 16 in wax.

13. A 19 (R. S. L.) Reaction product of formaldehyde and a Schiff base (1 mol. formaldehyde, 1 mol. acetaldehyde, and 2 mol. ethylidene-aniline). A brown resin whose sp. gr. is 1.10, activity 1.0, and melting point 80°C. Properties and field of application same as for A 16. Is preferred for tread compounds.

14. A 20 (R. S. L.) Reaction product of an aldehyde and a Schiff base, a thin oil, whose sp. gr. is 0.90, and activity 1.0. It can be used in bright colored compounds in the presence of the accelerators previously described. One-third consists of a high-boiling neutral oil. Whiting, magnesium carbonate, and stearic acid increase the accelerating power. Magnesium oxide is not recommended. Gas black and clay have considerable retarding effect, but antimony sulfide works well. Dosage 0.5 to 2.5, with 2.25 parts sulfur for non-blooming compounds, and 3.5 parts sulfur in compounds containing gas black.

15. A 32 (R. S. L.) Reaction product of an aldehyde and a Schiff base. Is a thin oil, whose sp. gr. is 0.99, and activity 1.0. Properties and field of application similar to those of A16.

16. A 50 (R. S. L.) Reaction product of formaldehyde and a Schiff base, which resembles A 19 in its properties and activity, though weaker. Especially suited for whole tires, roll-covers, etc. Dosage 1.0 to 1.75 parts accelerator, 3.5 sulfur.

17. B. B. (B. F. G., R. T. V.) Butyraldehyde-*p*-aminodimethylaniline, sp gr. 1.02, a brown oil, soluble in alcohol. Is active even in the absence of zinc oxide, and works well with whiting, magnesium oxide, and litharge. Activity 1.0. Is used principally in hard rubber compounds.

18. Crylene, hard (N. C.) Condensation product of acetaldehyde and aniline. A brown resin soluble in naphtha; sp. gr. 1.12; melting point 80°C.; activity 1.0. May be used for dark press-cured compounds. Is not suited for air-cures.

19. Crylene, paste form (N. C.) Condensation product of acetaldehyde and aniline and mixed with stearic acid. Sp. gr. 1.01. Activity 0.5.

20. E-A. (R. H.) Ethylidene-aniline, sp. gr. 1.12. A thick oil, possessing a characteristic odor. Is used for dark compounds, which are press-cured. Is not suited for air-hose. Activity 1.2.

21. Furfuramide (N. C.) An aldehyde-amine.

22. Grasselerator 808 (G. C.) An aldehyde-amine, sp. gr. 0.94. Is a thin oil with a slight aromatic odor. Activity 2.0. Finds general application in the most varied compounds, even those containing gas black and reclaim. Its activity begins at 120°C., but increases with the temperature. Suitable curing temperatures are 130° to 170°C. Produces high modulus, hence is especially suited for pure gum, non-blooming compounds. Sulfur required 1.5 to 2.0%. The curing curve is of the flat type.

23. Grasselerator 833 (G. C.) An aldehyde-amine, sp. gr. 0.85.

A thin oil, whose properties and application are the same as those of Grasselerator 808.

24. Heptene base (N. C.) Heptaldehyde-aniline, sp. gr. 0.93. A liquid suited to compounds cured in the press or in steam. Is not suited to compounds containing gas black or reclaim. Stearic acid and other acid materials weaken its strength. Zinc oxide is required. Activity 1.25. Shows no tendency to pre-cure.

25. Heptene (N. C.) A fluid, consisting of one part heptaldehyde-aniline and four parts mineral oil. Sp. gr. 0.94. See Heptene base above.

26. R and H 40 (R. H.) An aldehyde-amine.

27. Tensilac 39 (R. H. C.) An aldehyde-amine, sp. gr. 1.12. A finely divided resin with an ammoniacal odor. Activity 1.0. Recommended for tread compounds.

28. Tensilac 40 (R. H. C.) An aldehyde-amine, sp. gr. 1.15. Activity 1.5. Used for dark compounds of all sorts, even those containing reclaim. Shows no tendency to scorch.

29. Tensilac 41 (R. H. C.) An aldehyde-amine, sp. gr. 1.15. A resin. Activity 1.5.

30. Tensilac 50 (R. H. C.) An aldehyde-amine, sp. gr. 1.10. A finely divided resin. Activity 1.0.

31. Trimene base (N. C.) Triethyltriethylenetriamine. A condensation product of ethylamine and formaldehyde, sp. gr. 1.10. A thick brown oil with a weak ammoniacal odor. Activity 1.0. Does not color compounds and has no softening action. Is a commonly used accelerator, and may be used for press-cures, steam-cures, and air-cures.

32. Trimene (N. C.) A combination of triethyltriethylenetriamine and stearic acid, sp. gr. 1.02. A paste, non-hygroscopic, but soluble in water, and possessing a weak ammoniacal odor. Activity 0.8. Has a higher critical temperature than either diphenylguanidine or Trimene base. Is somewhat retarded by acid materials such as pine tar or rosin or by reclaim made with such materials. Five per cent of zinc oxide is recommended, although Trimene compounds vulcanize without it. To be used in the same way as Trimene base.

33. Vulcanex (du P.) An aldehyde-amine, sp. gr. 1.07. A brown resin, melting point 85°C., soluble in naphtha. Used in dark colored compounds and in hard rubber goods.

34. Vulcone (du P.) An aldehyde-amine similar to Vulcanex, sp. gr. 1.09. A brown resin, melting point 75°C., soluble in naphtha. Used in dark colored compounds and in hard rubber goods. Is weaker than Vulcanex.

35. Vulkacit 576 (I. G.) A liquid condensation product of homologues of acrolein and aromatic bases. It is especially suited for compounds containing reclaim, but not for white or colored compounds. Curing temperature from 22.5 lbs. up. Activity about 2.0.

36. Vulkacit Bp. (I. G.) A mixture of various high-boiling heterocyclic bases. A dark brown salve, which becomes fluid on warming; easily soluble in benzene but insoluble in naphtha. Activity about 1.5 to 2.0. Not suitable for white or colored compounds. Stearic acid raises the critical temperature.

37. Vulkacit T. R. (I. G.) A fluid mixture of polyamines of ethylene. Is active at low temperatures. Activity about 1.5 to 2.0. Vulcanizates made with it have no odor whatever, and present no health hazard.

38. Vulkacit 470 (I. G.) A condensation product of homologues of acrolein and aromatic bases. A brown resin showing a flat vulcanization curve. Used in friction compounds, dark colored mechanical goods, and hard rubber.

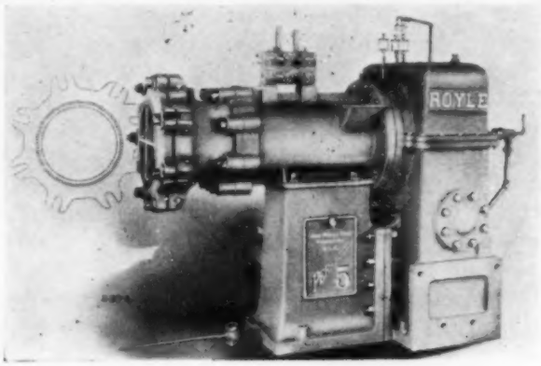
(*To be concluded in* THE RUBBER AGE, *March* 25)

NOTES.

1. *Kautschuk*, (1926) 91, 110, 137, 158, 180.
2. *Ind. Eng. Chem.* **19**, 1037 (1927).
3. *Kautschuk*, (1929) 75.
4. *Gummi-Ztg.*, **41**, 2978; **42**, 246.
5. *Z., angew. Chem.*, **37**, 595-596; **40**, 457-458.
6. I. G.—I. G. Farbenindustrie A.-G.
   D. C.—Dovan Chemical Co.
   R. S. L.—Rubber Service Laboratories Co.
   B. F. G.—B. F. Goodrich Co.
   N. C.—Naugatuck Chemical Co.
   B. D.—British Dyestuffs Corporation.
   L. V.—Lehmann & Voss.
   A. B. N. K.—Amsterdamsche, Bandoengsche und Nederlandsche Kininefabriken.
   M. T. D.—Midland Tar Distillers.
   du P.—E. I. du Pont de Nemours & Co.
   R. H.—Roessler & Hasslacher Chemical Co.
   R. T. V.—R. T. Vanderbilt Co.
   G. C.—Grasselli Chemical Co.
   Am. Cyan.—American Cyanamid Co.
   A. C.—Anchor Chemical Co.
   P. D. C.—Portsmouth Dye & Chemical Co.
   H. H. R.—The Hooley Hill Rubber Co.
7. Where it is impossible to give the accelerating strength in figures, the class to which it belongs is indicated.
8. *Kautschuk*, (1928) 4.
9. *India Rubber World*, **69**, (1928).
10. *India Rubber J.*, **75**, 13 (1928).
11. *Trans. Inst. Rubber Industry*, (1928) 85-101.
12. *India Rubber World*, (1928) 53-57.
13. All figures given in this review indicating the amount of accelerator, sulfur, or other compounding material present are calculated on the basis of 100 parts by weight of rubber.

Improvement Made on Strainer

AN improvement has been recently made on the 8-inch strainer manufactured by John Royle & Sons, Paterson, N. J., known as their Model 5. The improved model has a new hinged gate-type head, fastened by



7 toggle bolts, which are easily released allowing the head to swing back when a strainer plate is adjusted or removed. The new head and its operation is indicated in the accompanying illustration.

The advantages of the new improvement are that the head is easily cleaned and the expansion type head permits the area of opening of the drilled plate to equal the area of the cylinder opening, thus preventing any accumulation of stock at the strainer plate.

The capacity of the strainer is 2,000 pounds of plantation rubber per hour through a 35 mesh screen. A full description of the Model 5 strainer was carried in THE RUBBER AGE of August 25, 1929.

Rubber Experiments for School Children

THE educational department of the United States Rubber Company have recently revised the rubber experiments and materials, which they have been supplying to schools on request.

The experiments have been greatly simplified; so much so, in fact, that instead of making a charge of twenty-five cents to a school for a set of crude rubber samples and of one dollar for a set of experiments, the educational department is now able to furnish a box containing both the samples of crude rubber and a set of experiments for twenty-five cents. This charge just covers the cost of the material and the postage.

Each box contains four samples of crude rubber—sprayed rubber, para smoked sheet and crepe. In addition there is a tin contained carrying four ounces of rubber latex. A tin container is used instead of a glass bottle to prevent damage that might arise through the breaking of a glass container while the package is in the mails. In addition the package contains a small sheet of specially prepared rubber furnished by the General Laboratories, and a small envelope containing sulfur.

With these materials a teacher can show the pupils what crude rubber looks like in its best known forms, can perform the spectacular experiment of extracting of crude rubber from latex, and can show the pupils exactly what happens in vulcanization.

EDITORIAL COMMENT

Will a May Tapping Holiday Prove Effective?

OUT of the general uncertainty surrounding the Anglo-Dutch proposals for a tapping holiday during May comes only one significant fact, namely, for the first time in the history of the rubber growing industry, the British and Dutch producers have shown some agreement upon a definite policy.

No doubt a cessation in tapping during May will be beneficial to the market but it is extremely doubtful if the plan as proposed will be effective in bringing about a sufficient reduction in output to make any real dent in stock figures. The only effect of the plan will probably be a psychological one, but even here, such effect has largely been already discounted on the market, as witness the slight rise in values a fortnight ago with the subsequent drift back to the present low levels.

The inauguration of the scheme is contingent on its acceptance by 70 per cent of the plantation interests but the meeting in Amsterdam, scheduled for March 5, at which time producer interests representing British, Dutch, Belgian and French nationals were to have definitely voted on the plan, has been postponed until March 29, presumably because of the failure to amass sufficient interests. While the British Rubber Growers' Association has recommended to its membership the approval of the scheme, the Ceylon Proprietary Association does not agree to the plan on the ground that the month of May is unsuitable for a cessation of tapping as far as Ceylon is concerned. The whole idea is receiving but lukewarm support among the British companies, who have not forgotten that it was the Dutch that "let them down" in the case of the Stevenson restriction blunder. It is therefore extremely doubtful whether the requisite support of 70 per cent of plantation interests will be forthcoming.

But even should the scheme go into effect, the amount of rubber kept off the market will fall far short of a tonnage sufficient to make any real impression. In the first place no cooperation can be expected from the native planters who are now producing at least half of the rubber coming from Malaya and the Dutch East Indies, so that on the basis of a yearly production of 850,000 tons and a 100 per cent adherence of European producers the maximum curtailment which could be expected in any one month would be 35,000 tons. It is highly improbable that a 100 per cent adherence could be secured and 70 per cent would probably be a fairer figure, which would mean a maximum of 24,500 tons.

But there are other phases of the scheme which present difficulties to the plantation interests and which have not been satisfactorily answered. What would be the effect of this tapping holiday on the trees in the few months following? We have heard much about "flush" yields after restriction or rest periods. Will not the production in the subsequent months counter-balance the curtailment accomplished in May? What kind of a labor situation is going to result from a total suspension of tapping employment? Will tappers be content to turn to weeding and cleaning? The disruption of a well operating labor force on a well managed estate is a serious matter. If the pay of the labor force goes on without any production of rubber, how will the scheme be profitable to the estates, even if the market should be benefited a fraction of a cent per pound?

It has been complacently argued by advocates of the scheme that if a month's holiday is not sufficient to bring about the desired results a further month's restriction could be arranged. But in that case the questions above still remain unanswered and take on a considerably more serious aspect. A more sensible plan for a curtailment of production, if curtailment must be had, would be the cessation of all Sunday tapping. Such a plan would give 52 days' rest to the trees per year, evenly distributed, with no disruption in the labor force. Such a plan has often been proposed, and answering as it does, the major objections to the May holiday idea, it seems odd that the British and Dutch committees could not get together along these lines.

In their desire to adjust an economic situation overnight by a sudden stoppage of plantation activities for 31 days, they have not apparently studied all angles of the problem. The May holiday scheme may set off a series of repercussions as disastrous to the producer and market as was the case in the back-fires from the Stevenson Scheme.

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Representatives in all the rubber centers of the United States, Canada, England, France, Germany and the Middle East.

The Rubber Industry's CURRENT NEWS

Financial—Personals—New Rubber Products—
Building Operations—Manufacturing—Exports

STOCKHOLDERS REJECT FALLS-COOPER MERGER

The proposal to merge with the Falls Rubber Company, Cuyahoga Falls, O., was voted down by stockholders of the Cooper Corporation, Findlay, O., at a meeting held on February 27. The proposition failed to receive the necessary two-thirds vote, it was announced.

Directors of both firms had in late January approved a plan for the merging of the two companies into a new organization that would have assets of $4,000,000 and plant capacity of 4,000 tires daily. The plan involved an exchange of both Falls and Cooper common stock for common stock of the new company on a share-for-share basis, with special provisions for the preferred issues of the two firms. At a special meeting held on February 17 to consider the proposition, action was postponed until February 27.

At the meeting of Cooper stockholders, L. J. Cooper, J. M. Hutton, A. H. Morrel, Arthur T. Cavey and J. F. Schaeffer were elected directors for the year. It was rumored after the meeting that negotiations might be opened for a merger with the Giant Tire & Rubber Company, also of Findlay.

STEDMAN CHANGES NAME TO FEATURE FLOORING

At the annual directors and stockholders meeting of the Stedman Products Company, South Braintree, Mass., manufacturers of the well-known Stedman Reinforced Rubber Tile floors, held on February 18, it was voted to change the name of the concern from Stedman Products Company to Stedman Rubber Flooring Company. This change will go into effect immediately.

At the same meeting, the following executives were re-elected to serve as officers of the company throughout the coming year: Herbert O. Phillips of Pawtucket, president; James I. Finnie of Boston, treasurer; Merton A. Turner of Braintree, first vice-president; Water W. Rowse of Lexington, second vice-president; George W. Bailey of Weston, secretary.

During the course of the meeting the various officers reported that business conditions for 1929 were unusually favorable in spite of the recent stock market disorder. It was officially announced that the company's volume of business for 1929 was 23½ per cent in excess of that of 1928. The outlook for the coming year is equally bright.

Los Angeles Group Meets

Members of the Los Angeles Rubber Group held a joint meeting together with the Southern California Section of the American Chemical Society on February 26 at the City Club Building, Los Angeles, Cal. Following a dinner, Dr. Harrison E. Howe, editor of *Industrial and Engineering Chemistry*, addressed the gathering on the subject of "Alcohols New and Old."

Pail Firm Expands Rubber Plant

The Ohio Pail Company, Middlefield, O., has recently enlarged its rubber department by installing equipment for making tubing, having a cloth braid inside. This, the company believes, will open an entirely new field for its sales organization.

Complete Firestone Addition

Installation of machinery in the new addition to Plant 2 of the Firestone Tire & Rubber Company at Akron is now complete and work in the new unit is expected to reach a maximum efficiency this month. The seven-story steel and concrete structure affords 100,000 additional square feet of floor space. Offices for Plant 2 are located on the second floor, and the rest of the building is given over to manufacturing and warehouse purposes.

NEW RUBBER COMPANY IS FORMED AT CHARDON, O.

The Chardon Rubber Company has been organized at Chardon, O., and will manufacture rubber tubing, rubber hose and other specialties at that city. The officers of the new company include Robert L. Bostwick, president; Harry C. Bickle, first vice-president; George Munn, second vice-president; Wilson Smith, treasurer; and Harold K. Bostwick, secretary.

Machinery was installed this month in the south wing of the factory of the Asplin Basket Company, and thirty or forty workers are to be employed when the plant is fully under way. Several orders have already been received for delivery in April.

Victor M. Brediger, who has had 20 years of experience in the rubber industry, will be general manager of the new company. He recently resigned as manager of the Johnson Rubber Company, a subsidiary of the Ohio Pail Company, to come to the new organization. Claude Schreiner will act as chief chemist of the company.

BEDFORD TIRE & RUBBER PLANS REORGANIZATION

A meeting of stockholders of the Bedford Tire & Rubber Company, Bedford, Va., on February 25 heard a plan for placing the business of the company on a strong financial basis and for opening the plant for production at an early date. It is proposed that each stockholder relinquish a third of his stock, which will be sold to a New York firm, netting the Bedford Tire & Rubber Company approximately $250,000, this money to be used as operating capital.

The company ceased operations about a year ago, following a period of difficult sales and small profits. The plant was closed to reduce the stock on hand and to make plans for the future.

The company formerly manufactured Bedford and Blue Ridge tires and a full line of heavy duty gray tubes. The officers are Colonel William R. Phelps, president; E. D. English, vice-president; and J. J. Scott, secretary and treasurer.

CHICAGO RUBBER GROUP WILL MEET MARCH 21ST

Members of the Chicago Rubber Group of the American Chemical Society will hold their first spring meeting at Maillard's, Michigan and Jackson Boulevards, Chicago, on March 21. A dinner will precede the reading of two technical papers on the subject of milling and mixing.

The mechanical aspects of the subject will be discussed in a paper to be read by C. F. Schnuck, of the Farrel-Birmingham Company, Inc., Ansonia, Conn. The chemical side will be treated by Dr. Harlan A. Depew, research director of the rubber laboratory of the New Jersey Zinc Company.

Reservations for the meeting or further information may be obtained from B. W. Lewis, secretary of the Group, at Wishnick-Tumpeer, Inc., 365 East Illinois street, Chicago, Ill.

Plan N. T. D. A. Convention

H. A. Ruhnke of Milwaukee, well known in tire retailing circles, and Harlan Ware, convention manager of the Hotel Sherman, Chicago, Ill., have been in Akron this month in conference with C. A. Meyer, managing director of the National Tire Dealers' Association. The conference is to perfect plans for the 1930 exposition and convention of the association which probably will be held at the Hotel Sherman in November.

BEACON FALLS SHOE UNIT TO MOVE TO NAUGATUCK

C. E. Little, president of the Beacon Falls Rubber Shoe Company, Beacon Falls, Conn., announced on February 19 that the manufacturing activities of the company will be moved to Naugatuck, Conn., during the current year.

Arrangements have been made for manufacturing space in the plant of the Goodyear's Metallic Rubber Shoe Company at Naugatuck. As the new location is only three miles from the present factory, the majority of the present employes will be retained.

Mr. Little explained that the move is to be made in order to provide the Beacon Falls Company with better facilities. The buildings now occupied date back to 1853. The Naugatuck location will afford the most modern facilities for this particular line of manufacture.

GOODYEAR WILL TEACH ITS EMPLOYES BY MAIL

The establishment of a correspondence school for its employes who work in the field or at subsidiary plants is planned by the Goodyear Tire & Rubber Company. The company now maintains at Akron one of the largest industrial universities in the world, with an enrollment of 1,653 students and a staff of 13 full time and 19 part time instructors.

Two courses, business correspondence and foreman training, will be offered with the inaguration of the correspondence school unit of the university.

FABRIC BOYCOTT DENIED BY LORAY MILL MANAGER

J. A. Baugh, general manager of the Loray Mill, Gastonia, N. C., has denied recent rumors to the effect that tire factories over the country which employ union labor will not buy the Loray's fabric because it is made by non-union labor. According to Mr. Baugh, the Loray plant on February 3 shipped approximately $150,000 worth of automobile tire fabric to some of the same tire factories which have for years used the product manufactured by this plant. This is the largest single shipment the plant has made in some time.

In discussing the general situation, Manager Baugh stated that while the Loray Mill, like most other tire fabric factories, is still operating on a curtailed schedule, owing to a large overproduction during 1929, prospects of the present indicate increased operations in the near future. He declared that the outlook now is brighter than it has been for many weeks.

"Of course," Mr. Baugh added, "we are not looking for any avalanche of orders, but the situation is more stable than it has been for many weeks past. It will doubtless be some time before the tire fabric mills are running anything like full time, but there are strong hopes that the curtailment program will from now on be gradually reduced."

Walter Matthews

Walter Matthews, representing the B. F. Goodrich Company's footwear division in Milwaukee, Wis., and surrounding territory, died recently at his home in West Allis. Mr. Matthews was one of the most popular members of the Wisconsin Shoe Travelers' Association, in whose affairs he took an active part.

William H. Nichols

Dr. William H. Nichols, chairman of the board, Allied Chemical & Dye Corporation, former president of the Nichols Copper Company, and one of the most widely known figures in the American chemical industry, died on February 22 at the age of 78. Dr. Nichols, who acted last year as acting chancellor of New York University, was president of the American Chemical Society in 1918-1919 and president of the Society of the Chemical Industry in 1904-1905.

N. T. D. A. Aids Dealers

The National Tire Dealers' Association, Inc., is now distributing to its members a handbook on "Better Retailing" prepared by the National Cash Register Company. Representatives of the association are visiting members throughout the country to offer aid in contemplated changes in the conduct of the member's business.

U. S. Raises Footwear Prices

Prices on some items in the 1930 lines of waterproof footwear of the United States Rubber Company show a slight upward adjustment from the price list fixed on March 2, 1929. Stocks of footwear are believed to be under those of a year ago, owing to more favorable weather conditions, and better production control during 1929.

Decision Against Lambertville

The New Jersey court of chancery has handed down a decision ordering the Lambertville Rubber Company, Lambertville, N. J., to pay $2,675 in personal property taxes. The receivers for the old Lambertville Rubber Company had refused to pay the 1929 assessment because the property was sold at auction in December, 1928.

ERIE FOUNDRY COMPANY CLOSES AKRON OFFICE

The Erie Foundry Company, Erie, Pa., has announced the closing of its office in Akron, O., expressing the belief that its customers in that district can be better served from the home office at Erie.

While the Erie Foundry Company is an old, well established manufacturer of heavy equipment, it did not enter the rubber machinery field until three years ago. Its products, consisting of all sizes and types of presses used in the manufacture of rubber and plastic materials, have met with unusual success and are well received by the users. The company has greatly expanded its line of rubber working machinery, particularly in the hydraulic press department.

FARREL-BIRMINGHAM CO. ELECTS 1930 OFFICERS

At the annual meeting of the Farrel-Birmingham Company, Inc., held at the general offices in Ansonia, Conn., on February 20, Franklin Farrel, Jr., who was formerly vice-president, became chairman of the board, and N. W. Pickering was elected president to succeed Walter Perry.

D. R. Bowen, chief engineer, and Carl Hitchcock, formerly assistant secretary, Franklin R. Hoadley, manager of the foundry department, and A. G. Kessler, manager of the Buffalo division, were elected vice-presidents. Officers reelected were Alton Farrel, treasurer; G. C. Bryant, secretary; F. M. Drew, Jr., and L. K. Blackman, assistant treasurers; and W. B. Marvin, assistant secretary.

Foote Brothers Earnings Up

Foote Brothers Gear & Machine Company reports for the year 1929 net income of $612,618 after depreciation, federal taxes, etc., equal after 7 per cent preferred dividends to $2.34 a share (par $5) on 240,000 shares of common stock. This compares with $308,997, or $2.14 a share on 120,000 common shares in 1928. Stockholders approved an increase in authorized common stock from 250,000 to 500,000 shares.

Dow Chemical Note Issue

The Dow Chemical Company, Midland, Mich., has just sold through bankers an issue of $3,500,000 ten-year 6 per cent sinking fund gold notes to be used for an expansion of productive facilities necessitated by increasing business. Chemicals produced by the company, it is declared, are in growing demand from the dye, rubber, airplane, automobile, rayon and other industries.

Rubber Stocks Action Mixed

Goodyear common continued its advance during the fortnight, rising to a new high, but other rubber company issues were not quite so strong. Firestone common and preferred, on the other hand, dropped to new low levels. Prices of leading rubber company shares on March 5 compare as follows:

	Last Price		High	Low
	Mar. 5	Feb. 19	—1930—	
Ajax	2	2⅛	2⅛	1⅝
Falls	—	—	4⅝	3
Faultless	—	—	37	34⅝
Firestone	28	27	33⅛	26
do. 6% pfd.	81⅝	81⅞	86⅝	79¾
Fisk	3⅝	3⅞	4¼	3
do. 1st pfd.	16½	—	20	13
General	140	—	160	140
do. pfd.	—	—	91	88½
Goodrich	48½	48¼	51⅝	40¼
do. pfd.	—	—	95⅝	95⅝
Goodyear	84½	82⅞	88¼	62
do. 1st pfd.	99	99⅝	100¼	90
India	—	—	18	8½
Intercontinental	5⅜	6⅜	6⅜	4¼
Kelly Springfield	4⅝	4⅞	5⅝	3¼
do. 6% pfd.	—	—	39	29
Lee	—	—	9	6¼
Miller	4¼	4¼	4⅝	3⅞
do. pfd.	—	32½	34½	18
Mohawk	10½	12	14	8½
do. pfd.	—	—	55	50
Norwalk	—	—	1	⅞
Pirelli	48½	50	50¼	45
Raybestos-Manhattan	38	40¾	43½	33
Seiberling	16	16	18½	10¼
do. pfd.	—	75	78	64⅞
U. S. Rubber	27⅜	27½	29⅛	21⅛
do. pfd.	54	51¼	55	47¾

NAUGATUCK CHEMICAL CO. OFFERS TWO NEW ITEMS

The Naugatuck Chemical Company, 1790 Broadway, New York City, has introduced two new rubber chemicals to the industry this year under the names of Laurex and Tonox. The former is an organic acid softener and the latter a solid amine with anti-oxidant properties that improves resistance to abrasion.

The zinc salt of lauric acid, Laurex is a light gray soft granular powder with zinc content of about 17 per cent and specific gravity of about 1.10. Like stearic acid, its function in rubber compounding is to stabilize the curing quality of the rubber. Due to its solubility in rubber, Laurex is entirely free from the tendency to bloom and, therefore, is said to be an excellent activator for organic accelerators. When used in place of stearic acid, less zinc oxide is required as accelerator, and in the case of transparent goods the zinc oxide addition may be entirely omitted. The manufacturer states that the effect of Laurex on the tensile properties of vulcanized rubber is favorable.

Tonox is a new chemical unique in its effect on rubber. It is a solid amine melting at from 60 to 80 degrees Centigrade, soluble in organic solvents and slightly soluble in boiling water. The specific gravity is about 1.11. It is non-volatile and tests on, and experience with it, indicate that it is not harmful to workers. In moderate amounts (.25-1.0 per cent) Tonox mills into rubber readily and disperses readily and thoroughly. According to the manufacturer, Tonox improves resistance to abrasion, has anti-oxidant properties, accelerates the cure to some extent, toughens or hardens uncured stocks containing large amounts of carbon black, softens to a small extent cured carbon black stocks, softens uncured stocks of auto tube type, stiffens cured auto tube stocks somewhat and lengthens the curing range with certain accelerators. The use of from .25 to .50 per cent on the rubber increases the resistance to abrasion of tread type stocks from 10 to 25 per cent, as measured on laboratory abrasion machines.

Cutler-Hammer Income Gains

Preliminary reports of Cutler-Hammer, Inc., makers of electric control and other electric devices, at Milwaukee, Wis., show net income for the year ended December 31, 1929, of $2,687,000 after interest, federal taxes, etc., equivalent to $9.77 a share on 275,000 shares of no-par stock. In the preceding year the predecessor company, the Cutler-Hammer Manufacturing Company and subsidiaries reported net income of $1,441,218 or $5.24 a share.

Foote Brothers Name Agent

The Annex Equipment Company, 406 San Francisco Street, El Paso, Tex., has been appointed by Foote Brothers Gear & Machine Company, Chicago, Ill., as district representative of the Texas territory lying west of a line drawn from Farwell to Sweetwater and then south to Spofford. All of New Mexico and all of the states of Mexico, except the states of Nuevo Leon and Tamaulipas, are also included.

New Factory Equipment

American Flexible Coupling

The American Flexible Coupling Company, Erie, Pa., is now marketing a rather novel design of shaft coupling, known as the American flexible coupling. Kinematically the device is a variation of the well-known Oldham coupling in which a center member is constrained to slide across the face of one coupling flange on a line passing through the center and, at the same time, is

American Flexible Coupling

free to slide across the face of the second flange in a direction at right angles to the first.

The floating center member of the American flexible coupling is a square, hollow casting, with a hole in the center to provide clearance for the shaft ends. To the edges of this floating member are fastened replaceable bearing strips made from a hard, tough, non-metallic compound, such as is used in the manufacture of non-metallic pinions and gears.

The flange sections are identical and interchangeable, except for the bore diameters which are made to suit the shafts. A wide groove is machined in the face of the flange, leaving two jaws between which the floating member slides and by which the torque is transmitted.

The floating hollow center member is filled with a grease which passes to the surfaces of the wearing strips through suitable channels furnished with wicks.

It is stated by the manufacturer that the coupling provides maximum flexibility without the use of flexible materials; that the device does not deteriorate rapidly when subjected to moisture, heat and dirt and that it is convenient and accessible for replacement or repairs with a resulting low cost for maintenance and lost production time.

Freas Laboratory Ovens

The Freas Thermo-Electric Company, 1206 South Grove Street, Irvington, N. J., has announced a new series of controlled-heat, electric, laboratory ovens, with horizontal-flow forced-air circulations, introducing the advantages of heat transfer by mechanical air movement in a design which permits the use of shelves and trays without obstructing its air circulation. These ovens are recommended by the manufacturer for baking and drying a large number of samples simultaneously, for drying samples containing considerable moisture, for research where it is desired to maintain accurate and uniform heating conditions in all parts of the oven chamber, and other similar applications.

Double walls thoroughly insulate the chamber against outside temperature fluctuations and reduce the heat losses and current consumption to a minimum. Heaters are of nickel chromium alloy of the low-temperature gradient type. A Freas thermo-regulator of the differential linear expansion type, automatically maintains a constant temperature condition. The heat is transferred by propelled air under accurately controlled heating conditions.

The provision made for the introduction of fresh air directly into the heating compartment, so that it is first heated to temperature and mixed with that portion of the air that is recirculating, provides a uniform dilution of fouled air with dry fresh air. The heater design is such that a rapid replenishment of heat to the air takes place. The intake and exhaust of air is controlled by means of adjustable shutters on the vents and air ports.

Freas Laboratory Oven

The ovens are equipped with shelf racks and are furnished with two perforated steel shelves, which can be placed at any height in the chamber. They are available in various standard sizes and temperature ranges, and may be had mounted on a low table base or floor stand, as desired.

CATALPO

for

Mechanicals

Names in the News

FLOYD L. SULLIVAN, special agent of the Department of Commerce, who until recently has been stationed in the New York district office of the Bureau of Foreign and Domestic Commerce, handling matters relating to exports of automotive and rubber products, has been transferred to the office of the American commercial attaché at London, as trade commissioner. WILLIAM M. PARK will relieve Mr. Sullivan in the New York office.

CONGRESSMAN FRANCIS SEIBERLING, of Akron, a director of the Goodyear Tire & Rubber Company, last month applied for and was given permission to practice law before the United States Supreme Court. He is a member of the law firm of Slabaugh, Seiberling, Huber & Guinther.

R. W. SANFORD, a graduate chemist who has been with the B. F. Goodrich Company at Akron for four years as chemist and rubber compounder, has joined the staff of Wishnick-Tumpeer, Inc. For the present, his headquarters will be at the plant of the Century Carbon Company (owned and operated by Wishnick-Tumpeer, Inc.) at Monroe, La., where he will conduct extensive research on the application of Disperso carbon black to rubber compounds.

FRED MOORE, for 15 years New England manager of the B. F. Goodrich Company, has resigned to take charge of the New England business of the General Tire & Rubber Company. His headquarters will be at 560 Commonwealth Avenue, Boston, Mass.

ERNST A. WULLENWEBER, for eight years with the development department of the Hood Rubber Company, Watertown, Mass., has severed his connection with that organization. Previous to this period, Mr. Wullenweber was with the United States Rubber Company at Detroit, Mich., for 10 years. He has not as yet announced any plans for the future.

CAPTAIN CLARENCE B. LOBER of the United States Army Air Corps, as engineering representative of the army material division, will be added to the list of military representatives at the Goodyear-Zeppelin Corporation and the Goodyear Tire & Rubber Company in Akron in the near future. He will have charge of the inspection work on the various products being made for the army at these factories.

A. L. VILES, general manager of the Rubber Manufacturers Association, spoke on the present situation of the industry before a meeting of the Rubber Association of New Jersey at Trenton, N. J., on February 11.

C. W. SEIBERLING, vice-president of the Seiberling Rubber Company, was the principal speaker at the meeting of the Akron Tire & Battery Dealers' Association, held on February 18 at the University Club in that city. He urged that a strong Summit County organization be developed because of the large number of representatives sent to the national association from the Akron district.

J. R. WARFEL sailed from San Francisco on March 6 with his family to assume charge of mechanical goods production for the Goodyear Tire & Rubber Company factory at Sydney, Australia.

J. C. KOFFMAN, formerly assistant manager of the Chicago district office of the United States Rubber Company, has been

J. C. KOFFMAN

appointed as manager of the Milwaukee district. Mr. Koffman is well known in the midwest, having spent 15 years in that territory.

CARL F. OGREN, director of research and automotive engineer of the Thermoid Rubber Company, Trenton, N. J., gave a talk on "Asbestos" at the annual meeting of the Trenton Chapter, American Business Club, last month. He explained how asbestos was produced and described its uses.

C. EDWARD MURRAY, president of the Murray Rubber Company, Trenton, N. J., and Quarter Master General of the New Jersey National Guard, was given a testimonial dinner on March 8 by the members of the Wayside Club in honor of his 25 years of affiliation with the state militia.

V. R. JACOBS, assistant manager of the aeronautical department of the Goodyear Tire & Rubber Company, spoke before members of the Kiwanis Club of Kokomo, Ind., at a luncheon meeting on February 27. His topic was "Lighter Than Air Craft," and on the evening of the same day he addressed the members of the American Legion in Fort Wayne, Ind., on the same subject.

ROBERT L. BAIRD of H. Hentz & Company, New York City, and FREDERICK W. R. BRADDOCK of Hemphill's, Ltd., Sydney, Australia, have applied for membership in the Rubber Exchange of New York.

W. W. MURPHY has been appointed purchasing agent of the American Rubber Company, Cambridge, Mass., succeeding F. H. ROMEK, who resigned to accept a position with the Parkman-Wasgatt Company, Boston, Mass.

L. L. PASSMORE has been named by the Goodyear Tire & Rubber Company as factory representative for Louisville, Ky. Mr. Passmore was educated at Emory University and the University of Georgia and after considerable experience in banking and law, joined the Goodyear organization in 1927 as as a salesman at Cincinnati. Later he traveled the Bowling Green territory and then became city salesman at Evansville.

EARL HUMPHREY of the Miller Rubber Company presided over the meeting of the Advertising Club of Akron on February 18, at which EDWARD H. GARDNER of the J. Walter Thompson Company was the chief speaker. CLIFFORD ORR, of the Goodyear Tire & Rubber Company, entertained the group with some of his tricks of magic.

J. C. TREADWELL, long identified with crude rubber production in the Far East and with guayule production in America, has just returned to the United States after spending two years in Sumatra and the Philippines. Mr. Treadwell was in charge of the Caribbean party of the crude rubber survey of the Department of Commerce in 1923 and 1924.

WILLIAM B. WALKER, formerly in the purchasing department of the Hood Rubber Company, Watertown, Mass., and more recently connected with the sales department of that company, has been appointed purchasing agent of the Angier Corporation, Framingham, Mass.

E. R. WEIDLEIN of the Mellon Institute was the principal speaker at the meeting of the Akron Group of the American Chemical Society on March 6.

A. H. MAUDE, chemical engineer of the Rubber Service Laboratories Company, Nitro, W. Va., is visiting the Graesser-Monsanto Chemical Works, Ltd., Ruabon, North Wales, to advise on a program of expansion. He will not return to the United States for some months.

EARL G. STURDEVANT has resigned as head of the rubber compounding department of the Western Electric Company to accept a position in the general laboratories of the United States Rubber Company, Passaic, N. J.

Rubber News Around the World

INDIA TYRE & RUBBER MADE $633,875 IN 1929

The India Tyre & Rubber Company (Great Britain), Ltd., reports net profits for the year ended December 31, 1929, of £130,427, or about $633,875, as compared with net profits in the previous year of £30,945. This company, which is associated with the India Tire & Rubber Company, Akron, O., has been in actual production only since July, 1928, and in a year and a half has attained an important position in the manufacture of high quality tires in Great Britain.

The company has declared a dividend on the deferred ordinary shares of 27½ per cent for the year of 1929, compared with 17½ per cent in 1928. It is proposed to issue the balance of its authorized preference share capital, which consists of 100,000 shares of £1 par, at a price of not less than 21s. a share. This will make the issued capital £625,000 in £1 preference shares and £106,000 in 1s.-par deferred shares.

The company has been concentrating on the production of a super range of India tires and claims to be the only British company exclusively producing these. It is also producing at its factory at Inchinnan, Scotland, a heat-proof blue tube specially designed for high speed, heavy duty work, and of the same quality as the casings.

The earnings of the company have followed closely the estimates made by its officers. At the annual meeting in March, 1929, the managing director predicted that the profit for 1929 would be £130,000, and at the time the company was organized the prospectus estimate for 1928 profits was £30,000.

REDFERN'S RUBBER WORKS SHOW INCREASED PROFITS

The financial statement of Redfern's Rubber Works, Ltd., for the year of 1929 show a trading profit after depreciation of £22,366, or approximately $108,000, and interest on investments of £759. This compares with a 1928 showing of £13,648 as trading profit and £1,102 as interest on investments.

A final dividend of 5 per cent on the ordinary shares has been recommended, making a total of 7½ per cent for the year as against 5 per cent in the previous year. The report states that, owing to the fall in values of buildings and machinery since the war, a complete revaluation of the fixed assets has been made at the direction of the board. The difference disclosed by the new valuation has been written off, thus wiping out the capital reserve account and adjusting the small remaining balance in this year's depreciation.

Statistics of the British rubber industry show an unemployment rate of 10.8 per cent as of January 27, 1930.

I. R. I. Invitation Accepted

The Rubber Division of the American Chemical Society has accepted the invitation of the Institution of the Rubber Industry to attend a joint conference in England in May or June, 1931. J. M. Bierer has been appointed chairman of a sub-committee to make all arrangements, the other members being R. P. Dinsmore and Dr. A. A. Somerville.

Retail Rubber Stores in Paris

Several large rubber goods retail stores are to be opened in Paris by the Comptoir du Caoutchouc, France, which has been recently formed with a capital of 3,000,000 francs. The undertaking is sponsored by the Comptoir Commercial du Caoutchouc of Brussels, which operates a successful business of the same type in the Belgian city.

CARBON BLACK EXPORTS GAIN 21% DURING 1929

Exports of carbon black from the United States showed an increase of 21 per cent during 1929 as compared with the preceding year, rising from 77,903,153 pounds, with a value of $6,794,224, to 91,829,215 pounds, worth $8,270,837, a gain of $1,486,613. The four largest consumers both in 1928 and 1929 were the United Kingdom, France, Germany and Canada.

The exports to Russia, one of the smaller consumers, increased more than threefold, the gain in value being almost $100,000. This gain was linked with the larger consumption of crude rubber by the Soviet Union. Other countries to disclose substantial gains were Australia and Belgium.

BELTING FOR ENGLAND MUST NOW BE MARKED

Rubber and other belting (other than belting of metal) imported into the United Kingdom must in the future be marked so as to indicate its origin. The standing committee under the Merchandise Marks Act has reported in favor of an order respecting such machinery belting, including conveyor and elevated bands, and states that it is essential that the method of marking shall be of such a character that it can be readily checked by the customs authorities without risk of injury to the goods or delay to trade.

The committee thinks that the case will be met by requiring the indication of origin to be indelibly marked on a label securely attached to each coil by a band, the ends of which are brought together by a lead seal.

PHILLIPS RUBBER SOLES NETS $561,000 IN 1929

Phillips Rubber Soles, Ltd., largest rubber sole manufacturing firm in Britain, disclosed a net profit for the year of 1929 of £115,107, or about $561,000, as against £123,067 in the previous year. This was attributed to the exceptionally dry weather of 1929. A dividend of 15 per cent has been paid for the year. The balance of net profits earned during the year, after providing for all dividend on preference shares at 7½ per cent, is equal to about 27 per cent on the ordinary share capital of the firm.

Walter W. Phillips, chairman, said there had been a slight increase in competition during the year, but he believes this is good for the firm and acts as a tonic. The firm's product, "durata," mainly used as a leather substitute in shoes, has made substantial headway and has won good opinions for its wearing qualities. Nevertheless, Mr. Phillips stated his opinion that for health, comfort, and durability the ideal combination to wear is leather-soled shoes with rubber soles and heels attached.

John Cunningham, joint managing director, referred to the Phillips Employees Benefit Trust recently established through the generosity of Mr. Phillips. It consists of investments of a present market value of about £40,000 largely in the shares of the company. The fund will meet a real want for pensions and other benevolent purposes. Mr. Cunningham thanked Mr. Phillips for his generous action on behalf of the directors, staff and employees.

French Taxi Firm Makes Tires

The Compagnie Francaise des Automobiles de Place, of Paris, which is the owner of the largest taxicab fleet in the French capital, is achieving marked success in the manufacture of tires. Its "Vigor" casing is increasing in sales, especially in the south of France, partly because of the liberal terms to dealers and partly because of the feeling that such a large fleet operator should understand tire requirements of other users better than an ordinary manufacturer.

Golf Ball Imports

Imports of golf balls into the United States during January numbered 37,296, valued at $11,991, as compared with December imports of only 8,244 balls, worth $3,015. Imports in January, 1929, were 90,396 balls, valued at $11,192, according to the Department of Commerce. The unit value of the golf balls brought in during January, 1930, was 32.2 cents per ball, as compared to 36.6 cents in December and to 32.3 cents in November. All January imports were from the United Kingdom.

Current Crude Rubber Items

NATURAL CUT IN OUTPUT IS CONSIDERED LIKELY

That great wisdom must be shown in the selection of co-operative measures by the Dutch-British planters is the opinion of C. C. Johnston, of the Johnston Rubber Company, New York City. "Nomura & Company, Singapore, have cabled us that there is likely to be a decrease of from 20 to 30 per cent in rubber production during the period of February, March and April," he states.

"This cablegram is of particular interest when Amsterdam and London producers are talking over co-operative measures of voluntary crop restrictions. The Nomura company is in a position to speak with the authority of intimate contact through their branch factories in Borneo with the native planting situation.

"If the native rubber planter in the hinterland receives word that the 'orang putch' (the white man) is restricting tapping, he may be influenced to resume tapping on a scale commensurate with the capacity production of native gardens during the last three years of the Stevenson restriction enactment. If the London and Amsterdam group could bring about the adoption by a majority of the plantations of the ABC periodic tapping system, the tapping of native gardens at the prevailing rate of production might not be expanded because this system of tapping (under which the tappable trees on an estate are divided into three groups, A, B, and C, only two of which are tapped during any period of time, the remaining one-third rested), is already in vogue on a large number of plantations.

"The advantages of using this system are the lower production costs (less than three-quarters of the full tapping force of coolies being required to harvest over 90 per cent of the full crop), greater efficiency due to closer supervision, and the reduction in the amount of bark cut into by the tappers, together with the additional benefit to the trees that resting affords. Eventually the size of the crop is almost equivalent to that harvested from an alternate daily tapping of all of the trees, but during the first year or two after its introduction there is a small reduction in crop which in the aggregate might bring about an appreciable decrease in the production of plantations without causing the natives to tap their gardens more energetically."

Analysis of Tree Yields

The question of tree age and yield has recently been analyzed by T. A. Tengwall from statistics collected from plantations in Java and Sumatra. Production plotted against age of plantation shows a rapid increase from the fifth year, the increase continuing good, but diminishing, for five to six years. From the twelfth to the sixteenth year the increase is small and about the sixteenth year a decrease in yield starts and continues at a low rate until the twenty-fourth year when the data end.

Exchange Committees

The Rubber Exchange of New York has appointed the following new floor committee, effective March 1: J. Frank Dunbar, chairman; Lewis D. Raabin, Arthur L. Dunn, Alfred Croft and Werner S. Hammesfahr. The quotation committee and the committee on spot quotations remain unchanged.

Russian Synthetic Rubber

It is reported that the Soviet Union authorities have definitely decided to undertake the manufacture of synthetic rubber and that a plant for the purpose is already being installed at the Trengolnik Rubber Works in Leningrad.

MAJOR O. Z. IDE and LAWRENCE W. FALLIS spoke on February 12 before the Canadian Club of Detroit, Mich., on the subject of the Ford rubber plantation projects in Brazil. Both speakers have recently returned from the Ford concessions and described their experiences graphically.

In announcing the removal of T. A. Desmond & Company to new offices at 33 Rector street, New York City, on Page 496 of THE RUBBER AGE of February 10, this firm was inadvertently referred to as "crude rubber brokers." T. A. Desmond & Company have always been dealers in crude rubber and have never maintained a brokerage business.

SAYS HALT IN TAPPING WOULD DISRUPT LABOR

Cyril Baxendale, well known director of rubber estate companies, has stated that he sees no virtue in proposed restriction by cessation of Sunday tapping and says that total cessation of tapping for two months would seriously disorganize estate labor. Mr. Baxendale declares that one company with which he is interested has for 16 years restricted production by having from 25 to 33 per cent of its mature area out of tapping except for two years in which the policy was changed temporarily.

"The only possible scheme of restriction which promises any prospect of success is to reduce the acreage in tapping by an agreement between all European growers," he says. "This reduction should be done gradually so that the least possible disturbance is caused to labor. On every estate there are a certain number of coolies departing for their own country, particularly Tamils, and there need be no hurry about replacing them. Where tapping has been 'full-out' since the spring of 1928, many trees will be better for a rest."

Mr. Baxendale considers present world stocks about sufficient for six months' supply, and he thinks 1930 production will not much, if any, exceed that of 1929, believing new areas will just about balance reduced yields from old trees which have been tapped so vigorously since restriction ended. The subject of government restriction is not even mentioned as a possibility by Mr. Baxendale, who, however, urges better co-ordination of effort in extending new uses of rubber.

Floor Brokers' Dinner

A beefsteak dinner and party was staged by the floor brokers of the Rubber Exchange of New York on the evening of February 20 at Braunstein's, Union City, N. J. Speeches following the dinner were limited to two minutes each. The affair was arranged by Benjamin B. Millenthal, member of the firm of Lester Kittle & Company, rubber brokers, assisted by George Flack and Frank D. Pressigner, floor brokers.

Closing Prices on Rubber Exchange of New York, Inc.

FROM FEBRUARY 19 TO MARCH 4, 1930

		Spot	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Sales*
Feb.	19	16.40	16.30	16.50	16.80	17.00	17.20	17.30	17.50	17.60	17.80	18.00	18.20	——	640
	20	16.20	16.10	16.30	16.50	16.70	17.00	17.10	17.30	17.50	17.60	17.80	18.00	——	736
	21	16.50	16.30	16.60	16.90	17.10	17.30	17.50	17.70	17.90	18.00	18.20	18.40	——	954
	24	16.40	16.30	16.50	16.80	17.00	17.20	17.40	17.70	17.90	18.00	18.20	18.40	——	780
	25	16.00	15.80	16.10	16.40	16.50	16.70	16.90	17.20	17.40	17.50	17.70	17.90	——	959
	26	15.90	15.80	16.00	16.30	16.50	16.80	17.00	17.20	17.40	17.60	17.80	18.00	——	206
	27	15.60	15.50	15.70	16.00	16.20	16.40	16.60	16.90	17.10	17.20	17.40	17.60	——	473
	28	15.60	15.70	15.90	16.10	16.20	16.50	16.70	17.00	17.10	17.20	17.40	17.60	——	253
Mar.	1	15.60	15.40	15.60	15.90	16.10	16.30	16.50	16.80	17.00	17.10	17.30	17.50	17.70	213
	3	15.30	15.00	15.20	15.50	15.70	16.00	16.20	16.40	16.50	16.80	17.00	17.20	17.40	290
	4	15.20	15.10	15.30	15.50	15.70	16.00	16.20	16.40	16.60	16.70	16.90	17.10	17.30	445
	5	14.90	14.80	14.90	15.10	15.40	15.70	15.80	16.00	16.20	16.30	16.50	16.70	16.90	847

*In lots of 2½ tons each

CATALPO
for
Treads

TEXTILEATHER CORP. TO MOVE INTO NEW FACTORY

The new plant of the Textileather Corporation at Toledo, O., ground for which was broken on January 6, will be completed early next month and upon its completion the company will abandon its factory at Newark, N. J., and move all equipment to Toledo. The new structure, which has been built at a cost of between $500,000 and $600,000, is adjacent to the company's present Toledo plant and will furnish approximately 85,000 square feet of additional space and permit the establishment of an efficient department for rubber combining and rubber coating, as well as a solvent recovery system.

Until now, the Textileather Corporation has used rubber only for the combining of cotton textiles which were later processed into pyroxylin-coated materials. The new factory, equipped with the most modern machinery and equipment available, will make possible the manufacture of rubber-coated materials, particularly automobile deck materials.

Previously, it had been necessary for the company to have grey goods shipped from southern cotton mills to its Toledo plant to be put through a dyeing and finishing process, re-shipped to its Newark plant for rubber combining and pyroxylin coating, and then sent out again to consumers, the majority of whom are located in the middle western states. The completion of the new Toledo unit will enable the company to carry out its entire manufacturing and distribution activities at one point.

The company's present Toledo plant occupies 90,000 square feet of floor space, and the firm also owns twelve and a half acres of land at that location. The entire project has been financed within the company's own organization, and it now has a capital investment of $2,500,000. The officers are L. H. Green, president; J. D. Lippman, vice-president and general manager; D. E. Sturm, secretary-treasurer. Directors include Mr. Green, Mr. Lippman, C. O. Miniger, of the Electric Auto-Lite Company; H. E. Collin, of Collin, Norton & Company; and William Ford, of Ford & Blosser.

Weaver Ball Sales High

The C. B. Webb Company, Philadelphia, Pa., has announced that 1929 was a record sales year for Weaver Health Balls. According to Mr. Webb, the demand was so heavy that the factory was obliged to work at full capacity practically without a let up.

CATALPO

for

Frictions

Close Kenyon Warehouses

Announcement of the closing of factory warehouses of the S. Kenyon Tire & Rubber Company in Portland, Tacoma and Seattle was made this month by M. Lerman of the Triangle Tire Company, purchasers, who is in Portland supervising the sale of stores formerly carried on at these points. According to Mr. Lerman, all of the stock from Tacoma and Seattle, consisting of approximately $80,000 worth of tires and tubes, has been brought to Portland to be disposed of to consumer trade. The Kenyon Company is changing its plan of distribution, he stated, and will enlarge its San Francisco branch to adequately supply the coast.

Hood Leases in Cleveland

The Hood Rubber Company, a subsidiary of the B. F. Goodrich Company, has closed a three-year lease on the basement and 15,000 square feet of space on the first and second floors of the DeWees Building, St. Clair Avenue near West 3rd Street, Cleveland, O. The Hood wholesale business in tires, footwear and other rubber goods will be conducted in this building for the Cleveland territory. The company will have several times the space it has been occupying in a portion of the former Cleveland Railway power house building at Cedar Avenue and East 65th Street. The new lease is at $5,000 annual rental.

BALDWIN RUBBER COMPANY ELECTS 1930 OFFICIALS

N. Bradley Higbie, Jr., and C. B. Myers were elected to the board of directors at the annual meeting of the Baldwin Rubber Company on January 20, replacing C. R. Talbot and E. E. Staub. Mr. Myers was also made vice-president in charge of sales, having previously been sales manager. N. B. Eldred, Jr., secretary, was elected treasurer, succeeding Mr. Talbot in that position.

The Baldwin Rubber Company manufactures rubber floor mats and running board mats for automobiles and trucks in its plant at Pontiac, Mich. Its stocks are listed on the Detroit Stock Exchange, while the Class A shares are also listed on the Chicago Stock Exchange.

WILDMAN FACTORY BOUGHT BY OHIO PUBLIC SERVICE

The plant of the Wildman Tire & Rubber Company at Port Clinton, O., has been sold to the Ohio Public Service Company after several bids had been rejected as too low since it was first offered at auction in August, 1929. This property was established nearly 25 years ago when the Port Clinton Hardware Company was organized.

The plant, which has not been in operation for seven years, was at one time the factory of the Clinton Tire & Rubber Company, which sold the property and equipment to the Ohio State Tire & Rubber Company for about $150,000. Later the plant was taken over by the Wildman company, but was operated by them for only a short time.

DR. W. C. GEER ENGAGED IN AVIATION RESEARCH

Under the auspices of the Daniel Guggenheim Fund for the Promotion of Aeronautics, Dr. W. C. Geer, former vice-president of the B. F. Goodrich Company, is now working at Cornell University, Ithaca, N. Y., in an attempt to find some method of keeping ice off airplane wings. He has been designated as research associate to the department of physics at Cornell and is working together with Dr. Merrit Scott, research physicist.

At present he is searching for some solution that can be applied like paint and will be too slippery to hold ice, yet too hard to be dented by ice particles. Various solutions are being tried out by him on miniature wing tips in a newly devised wind tunnel, which produces at will all the ice conditions of the open air.

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HELP WANTED

PRACTICAL FOREMAN for a Rubber Room wanted by a large company in the New York district. Must be well experienced in rubber cement compounds, spreader work, etc. Write, giving age, experience and salary desired. Address Box 550, THE RUBBER AGE.

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LATE MARKET PRICES

RUBBER—COTTONS AND FABRICS—CHEMICALS

NEW YORK, MARCH 5, 1930

RUBBER

Crude

THE fortnight has seen a complete discounting of the proposal by British and Dutch producers to restrict tapping during the month of May. The spot price toward the end of February continued around a level of 16½ cents a pound for standard ribbed smoked sheets, the highest it has been since mid-December, but in a few trading days had dropped back a full cent and a half. There was considerable speculative selling at the close of the period, combined with liquidation by tired long accounts.

During the month of February the average closing price at New York was 15.85 cents a pound as compared with 15.24 cents in January and with 23.97 cents in February, 1929. Whether prices will have a slight rally this month or whether they will fall back to the low levels of the middle of January is uncertain, but it is likely that the rate of American consumption will have more effect on the situation than the efforts of European producers' committees to formulate a scheme of voluntary restriction of output.

Prices quoted on the New York outside market on March 5 were as follows:

Plantations—

Ribbed Smoked Sheets—			
Spot-Mar.	.14⅞	@	.15
Apr.-June	.15¼	@	.15½
July-Sept.	.16	@	.16¼
First Latex, crepe spot	.15	@	.15¼
Amber Crepe, No. 2	.13¾	@	.14
Amber Crepe, No. 3	.13½	@	.13¾
Amber Crepe, No. 4	.13	@	.13½
Brown Crepe, Clean thin	.13½	@	.13¾
Brown Crepe, specky	.13¼	@	.13⅜
Liquid Latex, per gal.	.90	@	

Paras—

Up-river Fine	.16½	@	—
Up-river Medium	Nominal		
Up-river Coarse	.08½	@	.08¾
Acre Bolivian, fine	.17	@	—
Caucho Ball, Upper	.08¼	@	.08½
Islands, fine	Nominal		

Centrals—

Central, scrap	.08¼	@	—
Esmeraldas	.08¼	@	—

Balata—

Block, Colombia	Nominal		
Block, Ciudad	.40	@	.41

LONDON MARKET

Standard Ribbed Smoked Sheets—Buyers			
Spot-Mar.		@	7⅝d
Apr.-June		@	7⅝d
July-Sept.		@	7⅝d

SINGAPORE MARKET

Standard Ribbed Smoked Sheets—Sellers			
Spot	7⅛	@	7¼d

Scrap

With demand continuing unchanged to slightly greater, scrap rubber has remained stable in price during the fortnight. Much heavier absorption by reclaiming mills is expected from the start of spring. Latest price quotations for the various grades were as follows:

(Prices to Consumer)

Auto tire peelings	ton	32.50	@	34.00
Standard White auto	ton	40.00	@	45.00
Mixed auto	ton	20.00	@	21.00
Bicycle tires	ton	17.50	@	19.00
Clean solid truck tires	ton	24.50	@	25.00
Boots and shoes	cwt.	1.38	@	1.40
Arctics, untrimmed	lb.	.00⅞	@	.01
Inner tubes, No. 1	lb.	.07¼	@	.07½
Inner tubes, No. 2, compounded	lb.	.03¾	@	.03⅞
Inner Tubes, Red	lb.	.03⅞	@	.04
Air Brake Hose	ton	20.00	@	22.50
Rubber Hose	ton	17.50	@	20.00

Reclaimed

Rubber Manufacturers' Association figures show that reclaimed rubber consumption in the last quarter of 1929 was 45,645 long tons and production 42,618 long tons. These figures would indicate that the amount of reclaim used in October, November and December was equal to 53.78 per cent of the amount of crude rubber consumed, as compared with a percentage of 50.08 in the third quarter of the year. Late prices were as follows:

High Tensile

Super-Reclaim No. 1 Black	lb.	.11¾	@	.12
High Tensile Red	lb.	.10¾	@	.11

Shoe

Unwashed	lb.	.07	@	.07¼
Washed	lb.	.09	@	.09½

Tube

No. 1 (Floating)	lb.	.12	@	.12¼
No. 2 (Compounded)	lb.	.09	@	.09½

Tires

Black	lb.	.07	@	.07¼
Black, selected tires	lb.	.07¼	@	.07⅜
Dark Gray	lb.	.08¼	@	.08½
Light Gray	lb.	.09½	@	.10
White	lb.	.11	@	.11½
Truck, Heavy Gravity	lb.	.07	@	.07¼
Truck, Light Gravity	lb.	.07¼	@	.07½

Miscellaneous

Mechanical blends	lb.	.06	@	.06½
Red	lb.	.10½	@	.11

COTTON and FABRICS

Cotton

ONCE again there has been a setback in the price of cotton on the New York market, the spot quotation for middling uplands on March 5 being 14.60 cents a pound. This is the lowest price for the commodity since early 1927 and shows the extent to which bear operators have been successful. The attitude of the Federal Farm Board and the government has been entirely discounted in the steady decline.

The average daily spot price on the New York market during February was 15.62 cents a pound, as compared with 17.21 cents in January and with 20.21 cents in February, 1929. The average for the month of March would appear likely to go even lower.

The high, low and closing prices on the New York Cotton Exchange on March 5 were as follows:

	High	Low	Close	Close
		Mar. 5		Feb. 19
Mar.	14.66	14.52	14.52	15.28
May	14.98	14.74	14.75	15.56
July	15.22	14.98	15.00	15.75

Tire Fabrics

Slightly lower in sympathy with the drop in quotations on raw cotton, the prices for tire fabric closed the fortnight as follows:

CORD

Peeler, carded, 23/5/3	lb.	.43½	@	.44
Peeler, carded, 23/4/3	lb.	.45½	@	.46
Peeler, carded, 13/3/3	lb.	.41	@	.41½
Peeler, carded, 15/3/3	lb.	.41½	@	.42
Egyptian, carded, 23/5/3	lb.	.48½	@	.48¾
Egyptian, combed, 23/5/3	lb.	.54½	@	.54¾

CHAFERS

Carded, American, 8 oz.	lb.	.37	@	.37½
Carded, American, 10 oz.	lb.	.38	@	.38½
Carded, American, 12 oz.	lb.	.37	@	.38
Carded, American, 14 oz.	lb.	.35½	@	.41

LENO BREAKER

Carded, American, 8¼ oz.	lb.	.38	@	.42
Carded, American, 10¼ oz.	lb.	.38	@	.42

SQUARE WOVEN

Carded, American, 17¼ oz. 23-11 ply	lb.	.43½	@	.44½
Carded, American, 17¼ oz. 10-ply	lb.	.36	@	.36½

Sheetings

Latest closing prices for sheetings, which are fractionally lower, were quoted by the Textile Brokers Association as follows:

40-inch, 2.50-yard	yd.	—	@	.10¾
40-inch, 2.85-yard	yd.	.09¼	@	.09⅝
40-inch, 3.15-yard	yd.	—	@	.10⅝
40-inch, 3.60-yard	yd.	.08⅝	@	.08¾
40-inch, 3.75-yard	yd.	.07¼	@	.07⅝
40-inch, 4.25-yard	yd.	.06¼	@	.06⅝

Ducks

Despite the decline in raw cotton and in other fabric goods, cotton ducks have remained stable in price during the fortnight. Latest closing price quotations follow:

Belting and Hose	lb.	.34½	@	.35
Enameling	lb.	.32	@	.32½
Single filling	lb.	.14½	@	.16
Double filling	lb.	.16	@	.17

CHEMICALS

WITH the exception of a reduction in the case of carbon blacks, the price range of rubber chemicals and compounding materials remained unchanged during the past fortnight. Quotations on the gas blacks fell off a half a cent a pound and have remained at that point despite occasional rumors of an increase. Overproduction is still apparent in this material, although domestic consumption and exports both gained heavily during the past year. At the close of the fortnight announcement was made of the organization of a new trade association to include the clay mining companies and importers and jobbers of clays such as are used in the rubber industry.

ACCELERATORS

Organic

A-1	lb.	.24 @	.27
A-5-10	lb.	.33 @	.36
A-7	lb.	.55 @	.59
A-11	lb.	.62 @	.66
A-16	lb.	.57 @	.61
A-19	lb.	.58 @	.62
A-20	lb.	.64 @	.68
A-32	lb.	.90 @	.95
Aldehyde ammonia, crystals	lb.	.65 @	.70
Aniline oil, drums, f.o.b. works	lb.	.15 @	.16
Captax	lb.	.60 @	.70
Crylene	lb.	.55 @	.65
paste	lb.	.45 @	.55
Di-Ortho-Tolyguanidine	lb.	.42 @	.44½
Diphenylguanidine	lb.	.30 @	.32½
Dipsol	lb.	4.30 @	4.50
Ethylidene aniline	lb.	.45 @	.47½
Formaldehyde aniline	lb.	.40 @	.42½
Heptene	lb.	.40 @	—
Hexamethylene-tetramine	lb.	.58½ @	.61
Lithex	lb.	.18 @	.20
Methylenedianiline	lb.	.37½ @	.40
Monex	lb.	3.25 @	—
Oxynone	lb.	.68 @	.80
Phenex	lb.	.75 @	—
R & H 40	lb.	.40 @	.42½
R & H 50	lb.	.40 @	.42½
R & H 397	lb.	.75 @	.77½
R-2	lb.	1.95 @	2.15
Safex	lb.	1.20 @	1.25
SPDX	lb.	.75 @	—
Super-Sulphur No. 1	lb.	.50 @	.52
No. 2	lb.	.18 @	.25
Tensilac, No. 39	lb.	.40 @	.42½
Tensilac, No. 41	lb.	.50 @	.52½
Thermic F	lb.	.50 @	.55
Thiocarbanilid, drums	lb.	.25½ @	.28½
Trimene	lb.	.75 @	—
base	lb.	1.20 @	—
Triphenylguanidine	lb.	.58 @	.62½
Tuads	lb.	3.25 @	3.50
Ureka	lb.	.75 @	1.00
Vulcanex	lb.		
Vulcone	lb.		
Vulcanol	lb.		
Z 88	lb.	.50 @	.60
Zimate	lb.	4.00 @	5.00

Inorganic

Lead, sublimed blue	lb.	.08¼ @	—
Lead, white	lb.	.08½ @	.08¾
Litharge, domestic	lb.	.09¼ @	.11
Magnesia, calcined, light	per 100 lb.	5.35 @	5.45
heavy	per 100 lb.	3.65 @	3.75

COLORS

Blacks (See Compounding Materials)

Blues

Prussian	lb.	.35 @	.36
Ultramarine	lb.	.06 @	.32

Browns

Sienna, Italian	lb.	.05¼ @	.12½
Umber, Turkey	lb.	.04½ @	.07

Greens

Chrome, light	lb.	.30 @	.32
medium	lb.	.31 @	.33
dark	lb.	.34 @	.36
Chromium Oxide, bbl.	lb.	.34½ @	.35½

Reds

Antimony crimson, 15/17	lb.	.40 @	.44
sulfur, free	lb.	.58 @	.66
golden 15/17 F.S.	lb.	.20 @	.25
Indian English	lb.	.08 @	.11
Domestic (Maroon)	lb.	.11 @	—
Oximony	lb.	.13¼ @	—
Red oxide, pure	lb.	.10 @	.12
Venetian red	lb.	.03 @	.06
Vermillion, quicksilver, English	lb.	2.00 @	2.05

Whites

Lithopone, Akcolith	lb.	.05 3/5 @	.06
Lithopone, Albalith	lb.	.05¼ @	.05¾
Lithopone, Azolith	lb.	.05¼ @	.05¾
Lithopone, Vanolith	lb.	.05¾ @	—
Titanox B, f.o.b. St. Louis,	lb.	.07¼ @	.07¾
Titanox C, f.o.b. St. Louis,	lb.	.07¾ @	.08¼

Zinc Oxide—American Process

American Azo: ZZZ (lead free)	lb.	.06½ @	.07
ZZ (leaded)	lb.	.06⅝ @	.06⅞
Horsehead Brand: Special	lb.	.07 @	.07½
XX Green	lb.	.07 @	.07½
XX Red, lead free	lb.	.06½ @	.07
Kadox, black label	lb.	.10⅝ @	.10⅞
blue label	lb.	.09⅝ @	.09⅞
red label	lb.	.08 @	.08½

Zinc Oxide—French Process

White seal	lb.	.11⅝ @	.11⅞
Green seal	lb.	.10⅝ @	.10⅞
Red seal	lb.	.09⅝ @	.09⅞

Yellows

Chrome	lb.	.17 @	.17½
Ocher, French medium	lb.	.02 @	.03
domestic	lb.	.01½ @	.02

COMPOUNDING MATERIALS

Aluminum Flake	ton	21.85 @	24.50
Ammonia carbonate, lump	lb.	.07½ @	.07¾
Asbestine	ton	14.75 @	18.00
Barium carbonate	lb.	.03½ @	.05
Barium Dust	lb.	.05 @	.06
Barytes southern off-color	ton	12.00 @	18.00
Western prime white	ton	23.00 @	—
imported	ton	27.00 @	36.00
Basofor	lb.	.04½ @	—

Blacks

Arrow "Aerfloted"	lb.	.06½ @	.12
Bone Black	lb.	.07 @	.08½
Carbon, compressed	lb.	.05 @	.10
Carbon, uncompressed	lb.	.05 @	.10
Disperso, f.o.b. Louisiana	lb.	.051 @	—
Disperso, f.o.b. Texas	lb.	.05 @	—
Drop Black	lb.	.06 @	.14
Fumonex	lb.	.04½ @	.08
Excello, compressed	lb.	.05½ @	.10
Gastex, f.o.b. Texas	lb.	.04¼ @	.05½
Lamp Black	lb.	.10 @	.40
Micronex	lb.	.05½ @	.11
Thermatomic-Thermax	lb.	.04 @	.07
Flex	lb.	.05 @	.08
P-33	lb.	.06 @	.09
United carbon, fob Tex.	lb.	.05½ @	.11
Velvetex carbon	lb.	.04 @	.06
Blanc fixe dry f.o.b. works	ton	75.00 @	90.00
Carrara filler	lb.	01¾ @	.02
Catalpo (fact.)	lb.	.02 @	—
Clay, China, domestic	ton	8.00 @	9.00
Aerfloted Suprex	ton	10.00 @	22.00
Congaree, e. l. f.o.b. mine	ton	9.00 @	—
Dark Blue Ridge	ton	9.00 @	20.00
Dixie	ton	15.00 @	29.00
Langford	ton	10.00 @	—
Lexington	ton	10.00 @	22.00
Mineral Flour, e. l. fob mine	ton	20.00 @	23.00
Par	ton	7.00 @	—
Tensulite		15.00 @	—
Glues, extra white	lb.	.22 @	.26
medium white	lb.	.20 @	.24
Magnesia, carbonate	lb.	08¾ @	.11
Mica, white water grnd.	lb.	.06 @	.08
Off color (biotite)	lb.	.05 @	.07
Rotten Stone powdered)	lb.	.02 @	.05
Soapstone, powdered	ton	15.00 @	22.00
Starch, powdered	cwt.	3.82 @	4.02
Talc, domestic	ton	12.00 @	15.00
Pyrax A	ton	7.50 @	—
Whiting, commercial	cwt.	1.00 @	1.25
English cliffstone	cwt.	1.75 @	2.00
Quaker	ton	13.00 @	22.00
Superfine	ton	10.00 @	12.00
Sussex	ton	8.00 @	15.00
Witco	ton	20.00 @	—
Zinc Carbonate	lb.	.09¼ @	.10½
Zinc Stearate	lb.	.23½ @	.25

MINERAL RUBBER

Genasco (factory)	ton	50.00 @	52.00
Granulated M. R.	ton	30.00 @	45.00
Hard Hydrocarbon	ton	24.00 @	40.00
Paradura	ton	62.50 @	65.00
Pioneer, MR, solid	ton	40.00 @	42.00
Pioneer-granulated	ton	50.00 @	52.00
R & H Hydro-Carbon	ton	27.05 @	29.00
Robertson, MR, solid	ton	34.00 @	80.00
M.R. (gran)	ton	38.00 @	80.00

SOFTENERS

Acids

Nitric, 36 degrees	cwt.	5.00 @	5.25
Sulfuric, 66°	cwt.	1.60 @	1.95
Tartaric, crystals	lb.	.38 @	.38½

Acids, Fatty

Laurex	lb.	.15 @	.16
Stearex	lb.	.15 @	.19
Stearic, double pressed	lb.	.17 @	.22

Alkalies

Caustic soda, 76%	cwt.	3.76 @	3.91
Soda ash, 58% C.L.	cwt.	1.40 @	

Oils

Corn, refined, bbls.	lb.	.07¾ @	.09¼
Cottonseed, crude		— @	.07¼
Cycline	gal.	.27 @	.34
Degras (c.l. 100 bbls.)	lb.	.03¾ @	—
Less c. l. (10-25 bbls.)	lb.	.04 @	—
Lots less than 10 bbls.	lb.	.04¼ @	.04½
Fluxrite	lb.	.05½ @	.06½
Palm Lagos	lb.	.07¾ @	—
Niger	lb.	.07½ @	—
Para-Flux	gal.	.17 @	—
Petrolatum, white	lb.	.08 @	.08¼
Pigmentaroil	gal.	.21 @	.36
Pine, steam distilled	gal.	.65 @	.70
destructively distilled	gal.	.55 @	.58
Witco Palm Oil	lb.	.11 @	—
Witco Softener (f.o.b. wks.)	lb.	.02 @	—

Resins and Pitches

Pitch, Burgundy	lb.	.06½ @	.07½
coal tar	gal.	.05½ @	.06
pine, 200 lb. gr. wt.	bbl.	9.00 @	10.00
Rosin, grade K, 280 lb. bbl.		— @	8.47
Pigmentar	lb.	.038 @	.0446
Tar Retort, 50 gal.	bbl.	13.50 @	15.00

Solvents

Acetone, pure	lb.	.11 @	.12
Alcohol denatured, No. 1 bbls.	gal.	.51 @	—
Benzol, 90%	gal.	.22 @	.24
Carbon bisulphide	lb.	.05½ @	.06¼
Carbon tetrachloride	lb.	.06¼ @	.07
Dryolene (f.o.b. Okla.)	gal.	.10 @	.10½
Gasoline, steel bbls.	gal.	.16 @	—
Naptha, solvent	gal.	.35 @	.40
Rub-Sol (f.o.b .Okla.)	gal.	.09 @	—
Turpentine, spirits	gal.	.53 @	.59
wood	gal.	— @	.50
destructively distilled	gal.	.40 @	.43

Waxes

Beeswax, white	lb.	.51 @	.53
Carnauba	lb.	.36 @	.37
Ceresin, white	lb.	.10 @	.11
Montan, crude	lb.	.06½ @	.07
Ozokerite, black	lb.	.24 @	.25
green	lb.	.26 @	.30

Paraffin (c. l.—f.o.b. N. Y.)

Yellow crude scale	lb.	.03½ @	—
White crude scale 124/126	lb.	.03½ @	—
Refined, 125/127	lb.	.04¼ @	—
Refined, 128/130	lb.	.04½ @	—
Refined, 135/137	lb.	.05¾ @	—
Refined, 138/140	lb.	.07¾ @	—

ANTI-OXIDANTS

Agerite, Resin	lb.	.57 @	.62
Powder	lb.	.57 @	.62
White	lb.	1.10 @	1.20
Albasan	lb.	.70 @	.75
Antox	lb.		
B-L-E	lb.	.57 @	.60
Neozone	lb.		
Oxynone	lb.	.68 @	.80
Resistox	lb.	.54 @	.57
Stabilite	lb.	.57 @	.62
Stabilite Alba	lb.	.70 @	.75
VGB	lb.	.55 @	.66

SPECIALTIES

Sunproof	lb.	.35 @	.37½
Tonox	lb.	.56 @	.60

SUBSTITUTES

Black	lb.	.08 @	.14
White	lb.	.10 @	.16
Brown	lb.	.08 @	.15

VULCANIZING INGREDIENTS

Sulfur Chloride (drums)	lb.	.03½ @	.04½
Sulfur flour, Ref'n'd, 100% pure (bags)	cwt.	2.40 @	2.75
Commercial (bags)	cwt.	1.75 @	2.10
Vandex	lb.	1.80 @	2.10

TIRES & TUBES
CRUDE RUBBER

STATISTICAL SECTION

AUTOMOBILES
GASOLINE

FIGURES compiled from the four quarterly reports of the Rubber Manufacturers Association show that crude rubber consumption in the United States during 1929 totaled 466,475 long tons. This is slightly under the totals of the association's monthly reports and the figure arrived at by the Department of Commerce after its recent survey.

Net imports for January were, as expected, slightly under 45,000 long tons, but were sufficiently above consumption to increase stocks on hand considerably. A better balance between February imports and consumption is looked for when these statistics are finally compiled.

Stocks of crude rubber in the United Kingdom continue to rise, and the increase last month was almost as great as the rate shown during the past fall. Combined London and Liverpool stocks on March 1 were 85,076 long tons as compared with 80,358 long tons on February 1.

Automobile production showed a noticeable increase during January, with 283,477 units being produced in the United States and Canada, and it is expected that February and March outputs will be equally promising, although not approaching the totals of last year.

Latest figures covering imports and exports from the leading producing and consuming countries have been added to the appropriate tables in this section.

PLAN OF THE SECTION

The statistics included in this section have been chosen for their constant importance to the rubber industry. The tables are reprinted in the same relative position in every issue, each table being kept current by the addition of new figures as soon as they become available.

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U. S. Imports and Exports of Crude Rubber

	Gross Imports			Re-exports			Net Imports
YEARS	Long Tons	Total Declared Value	Average Declared Value per pound Cents	Long Tons	Total Declared Value	Average Declared Value per pound Cents	Long Tons
1921	185,394	78,772,677	17.76	5,716	2,414,924	18.86	179,678
1922	301,076	101,843,188	15.10	4,809	1,921,828	17.84	296,267
1923	309,144	185,060,304	26.72	8,772	5,672,819	28.87	300,372
1924	328,056	174,231,331	25.71	10,309	6,057,637	26.23	317,747
1925	396,642	429,705,014	48.36	14,827	19,847,753	59.76	381,815
1926	413,338	505,817,807	54.63	17,671	28,470,583	56.77	395,667
1927	426,258	339,874,774	35.60	27,775	24,735,488	39.76	398,483
1928	439,731	244,854,973	25.03	32,159	18,128,361	25.17	407,572
1929	560,084	239,178,783	19.15	36,485	16,868,733	20.64	523,599
1927:							
July	37,677	21,678,259	37.53	1,958	1,569,853	35.59	35,719
Aug.	32,810	26,396,931	35.92	1,809	1,382,768	34.12	31,001
Sept.	33 301	25,314,412	33 94	3,500	3,036,929	38.74	29,801
Oct.	30,184	22,163,282	32.78	2,513	2,042,713	36.29	
Nov.	28,592	27,395,428	31.69	2,469	2,014,196	36.43	26,123
Dec.	30,787	22,213,574	32.26	2,655	2,245,754	37.77	28,082
1928:							
Jan.	39,107	30,278,444	34.56	1,988	1,734,990	38.95	37,119
Feb.	33,663	27,763,655	36.82	2,738	2,229,589	36.35	30,925
Mar.	40,611	32,103,042	35.29	3,718	2,587,435	31.07	36,893
Apr.	37,935	27,287,266	32.11	2,272	1,415,024	27.80	35,663
May	31,059	19,058,672	27.39	2,399	1,386,307	25.80	28,660
June	27,765	14,121,219	22.71	2,621	1,400,697	23.86	25,144
July	31,258	14,144,765	20.20	3,087	1,451,446	20.99	28,171
Aug.	31,204	12,860,150	18.39	2,377	1,084,646	20.37	28,827
Sept.	39,575	16,512,019	18.50	3,038	1,384,148	20.34	36,797
Oct.	44,058	18,200,332	18.44	2,405	1,055,407	20.15	41,653
Nov.	36,519	14,878,441	18.19	2,788	1,207,089	18.52	33,731
Dec.	43,511	17,580,946	18.04	2,738	1,165,743	19.00	40,773
1929:							
Jan.	57,564	22,872,943	17.74	3,663	1,771,401	21.61	53,901
Feb.	64,265	24,760,111	17.20	2,955	1,374,753	20.77	61,310
Mar.	80,604	29,389,905	17.98	4,218	2,094,097	22.16	46,386
Apr.	55,725	25,542,726	20.46	3,293	1,624,237	22.02	52,432
May	51,161	24,355,511	21.25	2,386	1,349,690	21.24	48,325
June	41,663	18,799,307	20.14	3,152	1,470,746	20.83	38,511
July	43,944	19,342,147	19.65	3,424	1,590,411	20.73	40,520
Aug.	37,222	16,530,090	19.83	2,644	1,222,217	20.80	34,578
Sept.	34,472	15,214,485	19.70	2,011	861,068	19.11	32,461
Oct.	38,163	16,192,261	18.94	2,614	1,190,510	20.33	35,549
Nov.	43,507	18,189,305	18.66	2,929	1,300,354	19.82	40,578
Dec.	42,952	17,573,330	18.27	2,745	1,007,279	16.38	40,207
1930:							
Jan.	47,496	17,793,563	16.72	3,144	1,077,415	15.30	44,352
Feb.							
Mar.							
Apr.							
May							
June							

U. S. Consumption of Crude Rubber

(Rubber Manufacturers' Association statistics raised to 100 per cent—All figures in long tons)

Figures on Monthly Basis

	1923	1924	1925	1926	1927	1928	1929	1930
Jan.	30,106	29,058	29,638	32,196	31,518	34,403	43,002	36,669
Feb.	30,149	25,736	29,761	31,136	30,137	33,702	41,594	
Mar.	36,629	28,385	33,498	32,936	36,141	35,688	44,730	
Apr.	29,085	27,129	34,139	32,696	35,871	32,772	47,521	
May	36,155	25,845	35,322	29,364	34,592	37,333	49,233	
June	24,272	22,753	35,822	28,598	33,801	37,676	43,227	
July	17,685	23,396	36,053	27,577	29,219	37,407	41,526	
Aug.	20,359	28,982	35,909	34,533	33,460	42,927	38,274	
Sept.	17,594	31,497	31,691	32,904	27,214	39,882	34,707	
Oct.	21,321	31,520	29,047	29,836	26,790	40,857	34,800	
Nov.	20,437	27,289	28,853	28,080	26,792	37,461	27,659	
Dec.	31,902	27,199	28,748	26,293	25,492	31,232	23,531	
Totals	305,694	328,769	388,481	366,149	371,027	441,340	469,804	

Figures on Quarterly Basis

Quarter	1922	1923	1924	1925	1926	1927	1928	1929
Jan./Mar.		96,776	87,609	95,263	94,301	99,216	103,558	128,565
Apr./June	127,360	89,493	75,674	104,099	87,109	103,242	103,500	139,292
July/Sept.		55,621	83,813	99,493	93,793	89,210	117,573	113,746
Oct./Dec.	155,067	63,617	92,656	85,789	83,212	80,860	117,597	84,872
Totals	282,427	305,507	339,752	384,644	358,415	372,528	442,227	466,475

Note—The Rubber Association estimates its monthly rubber consumption figures to be 90 per cent complete. Up until 1925 the quarterly figures were likewise estimated to be 90 per cent complete; beginning with 1925 an estimate of 92 per cent completeness has been used. These estimates have been used in raising the figures in this table to 100 per cent. The quarterly figures are generally regarded as the most authentic; the monthly figures may be accepted as preliminary.

Rubber Invoiced to the U. S.

(Reported by American Consuls—Quantities in Long Tons)

During the Week Ended	From Br. Malaya	From Ceylon	From Dutch East Indies	From London & Liverpool	Tota.
Dec. 7	8,543	1,920	2,115	16	12,594
Dec. 14	7,428	1,299	1,655	6	10,388
Dec. 21	7,599	1,953	2,003	22	11,577
Dec. 28	4,943	364	1,856	5	7,168
Jan. 4	8,067	1,587	2,419	251	12,124
Jan. 11	7,235	931	1,469	15	9,650
Jan. 18	7,009	898	1,560	49	9,516
Jan. 25	9,212	1,103	2,051	14	12,380
Feb. 1	5,078	1,213	1,679	98	8,068
Feb. 8	9,902	1,788	2,572	31	14,293
Feb. 15	7,223	1,312	1,315	59	9,909
Feb. 22	7,010	1,223	2,389	51	10,673
Mar. 1	8,146	2,315	2,898	57	13,416

Daily Spot Closing Prices of Ribbed Smoked Sheet Rubber—*New York Market, in Cents per Pound*

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Ave.
1927																																
Sept.	34	33⅝				33⅝	33⅝	33⅝	33⅝	33⅝		33½	34⅛	34⅛	34	34	33⅝	33⅝	33¾	33¾	33½	33¾	33¾	33½	34	33⅝	34	34	33⅝	33⅝		33⅝
Oct.	33⅝					33⅝	33⅝							34⅛	34⅛				34½	34½	34½	34⅝	34⅝	34⅝	34	34	35	35¼	35¼	35¼	35¼	34⅝
Nov.	35	35¼	35½			36¾			37	36⅝	36¾		36½	36½		37⅛	36⅝	37⅛	37⅛	38¼	38¼	38½	38½			40½	41¼	40⅝	41¼	41¼		37½
Dec.	40½	40¾	40½		40¾		40½		40½	40½			40½	39¾		40¾	40¾	40¾	40¾	40¾	40½	40¾	41									40¾
1928																																
January			41¼	41¼	41¼	41	41		40%	40½	40¼	40%		40½		40¼	40	40¼	40¼	40¼	40¼			40¼	40¼	39%	39¾	39¾	39¾	39%		40¼
February		87⅛	87⅜	87⅜		87⅜	86⅝				83⅜			84⅛		81¼	81¼			80⅜	28¾			28½		29	28¾	29			32⅜
March		29	28⅞		29	28¾	26¾	25½				24¼			25¼		25¼		28⅝	26¾	26	26¼				27¼	27¼	27¼				26½
April			27¼	27½	21¼					25¾																						
May		17½	17¾	18¾	19¼	19¾	19¾	19¾	20	18¾	18½	18½		18¾		18¾	18¾	19¾	17¾	17¾	17¾	17	17	17	17%	17%	20¼	19¾	19¾			19
June		19¾	18¾	19¾	19¾	19¾	19		18¾	19¾	19¾	19¾		19¾		19¾	19¾	19¾	19¾	19¾	19¾	19¾	19¾	19¾	19¾	19¾	19¾	19¾	19¾			19½
July		19½	18¾	19¾	19¾	19	19¾		19¾	19¾	19¾	19¾		19¾		19¾	19¾	19¾	19¾	19¾	19¾	19¾	19¾	19¾	19¾	19¾	19¾	19¾	19¾			19¾
August		19½	18¾	19¾	19¾	19¾	19¾		19¾	19¾	19¾	19¾		19¾		19¾	19¾	19¾	19¾	19¾	19¾	19¾	19¾	19¾	19¾	19¾	19¾	19¾	19¾			19¾
September			18¾	19¾	19¾	19¾	19¾		19¾	19¾	19¾	19¾		19¾		19¾	19¾	19¾	19¾	19¾	19¾	19¾	19¾	19¾	19¾	19¾	19¾	19¾	19¾			19¾
October		18¾	18¾	19¾	19¾	19¾	19¾		19¾	19¾	19¾	19¾		19¾		19¾	19¾	19¾	19¾	19¾	19¾	19¾	19¾	19¾	19¾	19¾	19¾	19¾	19¾			19¾
November		18¾	18¾	19¾	19¾	19¾	19¾		19¾	19¾	19¾	19¾		19¾		19¾	19¾	19¾	19¾	19¾	19¾	19¾	19¾	19¾	19¾	19¾	19¾	19¾	19¾			19¾
December		17¾		17¾	17¾	17¾	17¾		17¾	17¾	17¾	17¾		17¾		17¾	17¾	17¾	17¾	17¾	17¾	17¾	17¾	17¾	17¾	17¾	17¾	17¾	17¾			17¾
1929																																
January			18¾	18¾	18¾	18¾	18¾	18¾	18¾	18¾	18¾	18¾	18¾	18¾	18¾	18¾	18¾	18¾	18¾	18¾	18¾	18¾	18¾	18¾	18¾	18¾	18¾	18¾	18¾	18¾			18¾
February		23¾	22		21¾	22¾	22¾	22¾	22¾	22¾	22¾	22¾	22¾	22¾	22¾	22¾	22¾	22¾	22¾	22¾	22¾	22¾	22¾	22¾	22¾	22¾	22¾	22¾	22¾	22¾			22¾
March		26	26		26	26	25¾	25¾	25¾	25¾	25¾	25¾	25¾	25¾	25¾	25¾	25¾	25¾	25¾	25¾	25¾	25¾	25¾	25¾	25¾	25¾	25¾	25¾	25¾	25¾			25¾
April		23	22¾	22¾	22¾	22¾	22¾	22¾	22¾	22¾	22¾	22¾	22¾	22¾	22¾	22¾	22¾	22¾	22¾	22¾	22¾	22¾	22¾	22¾	22¾	22¾	22¾	22¾	22¾	22¾			22¾
May		21¾	19¾	19¾	19¾	19¾	20¾	21¾	21¾	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21			21
June		21¾	21	21¼	21¼	21¼	21¼	21¼	21¼	21¼	21¼	21¼	21¼	21¼	21¼	21¼	21¼	21¼	21¼	21¼	21¼	21¼	21¼	21¼	21¼	21¼	21¼	21¼	21¼	21¼			21¼
July		20¾	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21			21
Aug.		21¾	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21			21
Sept.		21¾	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21			21
Oct.		21¾	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21			21
Nov.		21¾	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21			21
Dec.		21¾	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21			21
1930																																
January		21¾	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21			21
February		21¾	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21			21
March		21¾	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21			21

Average Spot Closing Prices—Ribbed Smoked Sheets

(New York Market)

Average Price per Pound for Years 1910-1921

Year	Cents	Year	Cents	Year	Cents
1910	206.60	1914	65.33	1918	60.15
1911	141.30	1915	65.85	1919	48.70
1912	121.60	1916	72.50	1920	36.30
1913	82.04	1917	72.23	1921	16.36

Average Monthly Price per Pound Since 1922

Months	1922 Cents	1923 Cents	1924 Cents	1925 Cents	1926 Cents	1927 Cents	1928 Cents	1929 Cents	1930 Cents
Jan.	18.82	32.73	25.86	36.71	79.50	38.75	40.25	20.14	15.24
Feb.	16.12	35.14	25.29	36.01	62.25	38.25	32.75	23.97	15.85
Mar.	14.53	34.21	22.33	41.00	59.00	41.04	26.82	24.55	——
Apr.	15.99	32.48	22.51	43.64	51.25	40.86	18.97	21.18	——
May	15.25	27.39	18.89	58.47	47.75	40.76	18.99	21.46	——
June	15.11	26.88	18.81	77.26	42.50	37.25	19.59	20.64	——
July	14.67	26.10	22.16	103.16	41.03	34.87	19.40	21.30	——
Aug.	13.93	28.84	26.17	82.99	38.50	35.12	19.46	20.59	——
Sept.	14.44	28.95	27.56	88.88	41.00	33.67	18.47	20.37	——
Oct.	19.78	26.93	31.13	98.01	42.50	34.32	18.83	19.67	——
Nov.	23.88	27.14	34.33	104.80	38.50	37.58	18.26	16.62	——
Dec.	27.42	26.60	37.88	98.51	38.25	40.63	17.97	16.12	——
Average for Year	17.50	29.45	26.20	72.46	48.50	37.72	22.48	20.55	——

London Closing Prices of Ribbed Smoked Sheet

(In Pence Per Pound)

Day	Dec.	Jan.	Feb.	Mar.	Day	Dec.	Jan.	Feb.	Mar.
1	—	—	7⅝	7⅞	17	8	7⅝	8	—
2	8	7⅞	—	—	18	8	7¾	8⅛	—
3	7⅞	7¾	7½	7⅞	19	7⅞	—	8¼	—
4	8	7¾	7½	7¾	20	7⅞	7⅝	8¼	—
5	8	—	7½	—	21	7⅞	7⅝	8¼	—
6	8	7¾	7⅝	—	22	—	7⅝	8⅜	—
7	8	7⅝	7¾	—	23	7¾	7⅝	—	—
8	—	7⅜	7⅞	—	24	7¾	7½	8⅛	—
9	8	7⅜	—	—	25	—	7½	8⅛	—
10	8	7⅛	7⅞	—	26	—	—	8⅛	—
11	8⅛	7	7⅞	—	27	7⅞	7½	7⅞	—
12	8	—	8	—	28	7⅞	7½	7⅞	—
13	8	7¼	8	—	29	—	7½	—	—
14	8	7¼	8	—	30	8	7½	—	—
15	—	7¼	8	—	31	8	7½	—	—
16	8	7½	—	—					

Average Monthly Price Per Pound

Month	1928 Pence	1929 Pence	1930 Pence	Month	1928 Pence	1929 Pence	1930 Pence
Jan.	19.310	9.942	7.471	Aug.	9.300	10.505	——
Feb.	15.713	11.875	7.948	Sept.	8.530	10.160	——
Mar.	12.736	12.135	——	Oct.	8.807	9.620	——
Apr.	8.864	10.490	——	Nov.	8.596	8.442	——
May	8.845	10.717	——	Dec.	8.570	7.958	——
June	9.293	10.580	——	Average			
July	9.312	11.065	——	for Year	10.656	10.291	——

Spot Closing Cotton Prices

(Middling Upland Grade—New York Market)

Recent Daily Price Per Pound

Day of Month	Feb.	Mar.	Day of Month	Feb.	Mar.	Day of Month	Feb.	Mar.
1	16.50	15.10	11	15.90	——	21	15.30	——
2	——	——	12	——	——	22	——	——
3	16.10	15.00	13	15.80	——	23	——	——
4	16.20	14.90	14	15.85	——	24	14.90	——
5	16.15	——	15	15.90	——	25	15.10	——
6	15.75	——	16	——	——	26	15.15	——
7	15.20	——	17	15.65	——	27	15.35	——
8	15.40	——	18	15.65	——	28	15.30	——
9	——	——	19	15.40	——	29	——	——
10	15.75	——	20	15.40	——	30	——	——
						11	——	——

Average Monthly Price Per Pound

Month	1928 Cents	1929 Cents	1930 Cents	Month	1928 Cents	1929 Cents	1930 Cents
Jan.	19.12	20.22	17.21	Aug.	19.28	18.62	——
Feb.	18.40	20.21	15.62	Sept.	18.67	18.83	——
Mar.	19.38	20.19	——	Oct.	19.62	18.46	——
Apr.	20.63	20.29	——	Nov.	19.84	17.53	——
May	21.58	19.41	——	Dec.	20.22	17.28	——
June	21.50	18.74	——	Average			
July	21.36	18.62	——	for Year	19.97	19.03	——

Stock of Crude Rubber in the U. S.

(All Quantities in Long Tons)

At	ON HAND			AFLOAT			ON HAND AND AFLOAT		
End of	1928	1929	1930	1928	1929	1930	1928	1929	1930
Jan.	110,244	76,342	120,649	41,256	78,596	61,863	151,500	154,938	182,512
Feb.	108,955	90,058		43,316	63,825		152,271	153,883	
March	114,061	100,536		39,324	56,476		153,385	157,012	
April	113,083	107,659		33,986	55,409		147,069	163,068	
May	105,356	97,192		34,374	55,404		139,730	152,596	
June	90,198	92,061		40,001	46,035		130,119	138,096	
July	83,242	92,535		42,304	38,858		125,546	134,393	
Aug.	68,994	90,769		51,875	41,618		120,869	132,387	
Sept.	68,851	84,362		48,566	49,480		117,417	133,842	
Oct.	66,421	88,483		41,571	62,294		107,992	150,777	
Nov.	61,956	92,219		68,119	62,358		130,075	154,577	
Dec.	66,166	105,138		68,764	62,389		134,930	167,527	

(Rubber Manufacturers' Association figures raised to 100%.)

Stock of Crude Rubber in London

(No. of Tons in Wharves and Warehouses, including Latex)

At end of	1927	1928	1929	At end of	1927	1928	1929
Jan.	64,994	66,524	25,191	July	63,717	35,429	30,080
Feb.	58,826	62,964	25,554	Aug.	64,491	32,084	35,605
Mar.	63,055	58,272	28,214	Sept.	68,236	31,440	42,188
Apr.	66,897	53,425	31,368	Oct.	69,569	24,207	47,803
May	67,169	44,628	31,290	Nov.	67,050	17,775	52,454
June	63,902	38,756	31,025	Dec.	63,793	19,815	54,304

At End of Recent Weeks

Stocks in London

	First Saturday	Second Saturday	Third Saturday	Fourth Saturday	Fifth Saturday
1929					
May	31,580	31,127	30,955	30,893	———
June	31,539	31,635	31,127	30,617	30,982
July	29,996	30,661	30,790	30,167	
August	30,937	31,444	33,573	34,651	35,605
September	36,620	37,901	40,151	42,077	
October	43,478	44,339	45,711	46,819	
November	48,092	49,302	50,068	51,012	52,538
December	53,431	53,180	53,894	54,260	
1930					
January	56,616	58,990	59,607	59,984	
February	60,460	61,482	62,659	62,725	
March	64,383				

Stocks in Liverpool

1929					
May	4,614	4,384	4,216	4,665	———
June	4,642	4,750	4,733	4,515	4,628
July	4,398	4,547	4,757	4,739	———
August	4,662	4,481	5,993	7,285	7,560
September	8,351	8,660	9,780	10,161	———
October	10,795	11,571	11,788	12,665	———
November	14,272	16,158	17,543	17,479	17,752
December	17,922	18,263	18,696	19,059	
1930					
January	19,433	19,640	19,515	20,063	———
February	19,898	19,761	19,677	19,704	
March	20,693				

Rubber in Singapore and Penang

(Stocks held by Dealers—Quantities in Long Tons)

End of	1928	1929	1930	End of	1928	1929	1930
Jan.	25,868	29,617	37,123	July	18,663	33,859	———
Feb.	22,867	32,373	———	Aug.	18,971	30,834	———
Mar.	20,538	29,437	———	Sept.	14,898	32,138	———
Apr.	16,946	26,474	———	Oct.	12,149	33,770	———
May	17,437	30,764	———	Nov.	29,188	30,963	———
June	18,207	30,403	———	Dec.	32,895	35,548	———

Rims Inspected and Passed in U. S.

(Tire and Rim Association Reports)

	Total	Per Cent Balloons		Total	Per Cent Balloons
1922	16,297,735	0.0	1926	24,199,524	78.8
1923	23,140,620	0.6	1927	19,700,003	79.1
1924	21,863,311	19.7	1928	24,247,282	81.6
1925	26,001,664	66.9	1929	24,141,502	80.3
1929			1930		
July	1,896,666	78.2	January	1,601,326	84.0
August	1,570,099	79.4	February		
September	2,110,003	80.7	March		
October	1,647,350	76.4	April		
November	596,989	64.7	May		
December	879,259	79.0	June		

U. S. Consumption of Gasoline

(In Barrels of 42 Gallons)

MONTHS	1928	1929	MONTHS	1928	1929
January	20,938,000	22,602,000	July	30,960,000	36,860,000
February	21,186,000	22,776,000	August	33,148,000	37,759,000
March	24,041,000	28,495,000	September	29,691,000	34,193,000
April	25,712,000	32,019,000	October	30,610,000	32,816,000
May	27,355,000	34,117,000	November	26,222,000	31,502,000
June	29,022,000	33,168,000	December	26,644,000	26,550,000

U. S. Tire and Tube Statistics

(All Figures Represent Thousands)

AUTOMOBILE CASINGS

Figures for Recent Years

	1922	1923	1924	1925	1926	1927	1928	1929
Production	40,932	45,259	51,633	60,845	61,237	64,439	77,944	73,308
Shipments	39,987	45,204	50,120	59,262	59,002	64,059	74,296	74,021
Inventory[2]	6,132	5,772	7,427	8,142	10,456	10,264	13,624	12,627

Figures for Recent Months

	PRODUCTION			SHIPMENTS			INVENTORY		
	1927	1928	1929	1927	1928	1929	1927	1928	1929
Jan.	4,965	5,358	6,722	4,932	5,394	6,626	10,432	9,940	13,712
Feb.	5,095	6,363	6,912	4,458	5,031	5,282	11,075	11,721	15,495
Mar.	6,276	6,819	7,519	5,701	5,731	6,708	11,865	12,889	16,351
Apr.	6,299	6,178	7,884	5,701	5,812	7,294	12,122	12,71.	16,929
May	6,151	6,759	8,145	5,657	6,457	7,184	12,462	13,024	17,849
June	6,202	6,692	7,304	6,253	7,117	7,254	12,462	12,162	17,957
July	5,087	6,498	6,475	5,973	7,895	7,855	11,326	11,157	15,830
Aug.	5,752	7,469	5,806	6,393	8,403	7,845	10,721	10,084	14,226
Sept.	4,822	6,802	4,758	5,717	7,145	5,998	9,722	9,765	12,875
Oct.	4,773	7,326	4,919	4,799	5,717	4,960	9,665	11,520	12,845
Nov.	4,502	6,075	3,603	4,306	4,998	3,558	10,136	12,579	12,935
Dec.	4,497	5,605	3,261	4,165	4,591	3,346	10,264	13,624	12,627

AUTOMOBILE INNER TUBES

Figures for Recent Years

	1922	1923	1924	1925	1926	1927	1928	1929
Production	50,850	60,116	70,706	82,614	76,618	70,823	80,180	73,417
Shipments	49,673	59,072	68,016	81,004	71,591	72,896	77,127	75,298
Inventory[2]	7,643	8,425	11,052	11,313	16,200	13,692	16,117	13,660

Figures for Recent Months

	PRODUCTION			SHIPMENTS			INVENTORY		
	1927	1928	1929	1927	1928	1929	1927	1928	1929
Jan.	5,337	5,441	6,517	6,016	6,072	7,242	15,585	12,982	15,386
Feb.	5,658	5,895	6,769	5,120	5,431	5,278	16,075	14,650	16,999
Mar.	7,184	6,231	7,466	6,157	5,731	6,737	17,096	15,573	17,750
Apr.	7,373	6,661	7,634	6,359	5,702	7,164	17,801	16,638	18,134
May	6,737	7,168	7,660	6,140	6,300	7,038	18,389	17,702	18,928
June	6,306	6,953	6,978	6,832	7,136	6,950	17,858	17,159	18,741
July	5,284	6,674	6,178	7,070	8,729	8,113	16,004	14,974	16,332
Aug.	6,480	8,343	5,846	7,983	9,350	8,183	14,664	13,931	14,157
Sept.	5,651	7,103	5,536	6,758	7,154	6,250	13,511	13,543	13,424
Oct.	5,065	6,929	5,310	5,024	5,662	5,001	13,539	15,285	13,656
Nov.	4,775	5,592	3,780	4,723	5,002	3,712	13,585	15,743	13,701
Dec.	4,969	5,184	3,716	4,712	4,858	3,631	13,692	16,117	13,660

(1) Rubber Manufacturers' Association figures, raised to 100%. The Association estimates its figures to be 75% representative or complete when issued and that basis has been accepted when preparing the statistics in this table.

(2) Held by manufacturers at end of period indicated.

Automobile Production

	United States			Canada			
	Total	Passenger Cars	Trucks	Total	Passenger Cars	Trucks	Grand Total
1923	4,020,255	3,631,728	388,527	146,438	129,228	17,210	4,166,693
1924	3,600,918	3,203,049	397,869	135,246	117,765	17,481	3,736,164
1925	4,265,704	3,760,459	505,245	161,389	139,311	22,078	4,427,093
1926	4,298,799	3,808,753	490,046	205,092	164,483	40,609	4,503,891
1927	3,393,887	2,938,868	453,019	179,426	146,870	32,556	3,573,313
1928							
July	390,445	237,933	52,512	25,226	20,122	5,104	415,671
Aug.	458,429	400,689	57,740	31,245	24,274	6,971	489,674
Sept.	413,722	358,872	54,850	21,193	16,572	4,621	434,915
Oct.	397,096	339,976	57,120	18,536	13,016	5,520	415,632
Nov.	256,936	217,256	39,680	11,769	8,154	3,615	268,705
Dec.	233,135	205,144	27,991	9,425	6,734	2,691	242,560
TOTAL	4,857,384	3,826,613	530,771	242,382	196,737	45,645	4,599,944
1929							
Jan.	402,154	350,617	51,537	21,501	17,164	4,337	423,655
Feb.	466,084	407,589	58,495	31,287	25,584	5,703	497,371
March	584,733	513,266	69,559	40,621	32,833	7,788	625,354
April	620,656	538,679	81,977	41,901	34,392	7,509	662,557
May	603,969	516,055	86,596	31,559	25,129	6,430	635,528
June	545,252	453,956	91,296	21,492	16,511	4,981	566,744
July	500,331	427,213	73,118	17,461	13,600	3,861	517,792
Aug.	499,629	444,711	54,918	14,214	11,037	3,177	513,843
Sept.	415,332	365,651	49,681	13,817	10,710	3,107	429,149
Oct.	380,011	321,195	58,816	14,523	8,975	5,548	394,534
Nov.	217,570	170,928	46,642	9,424	7,137	2,287	226,994
Dec.	119,950	92,717	27,233	5,495	4,426	1,069	125,445
TOTAL	5,358,361	4,603,609	754,752	263,295	207,498	55,797	5,621,656
1930							
Jan.	273,089	235,099	37,990	10,388	8,856	1,532	283,477
Feb.							
March							
April							
May							
June							

Exports of Crude Rubber from Principal Producing Countries

(Long Tons)

	BRITISH MALAYA[1]								DUTCH EAST INDIES[2]						
	Gross Exports	Imports	Gross Exports Minus Imports	Ceylon[3]	India & Burma[3]	Sarawak[4]	British North Borneo[4]	Siam[4]	Java & Madura	Sumatra E. Coast	Other D.E.I.	Indo-China[5]	Amazon Valley	All Other[4]	World Total[7]
1923	252,016	70,432	181,584	39,971	6,416	5,705	4,237	1,718	32,930	46,344	57,822	5,067	16,765	7,856	406,955
1924	259,706	108,524	151,182	39,997	7,697	6,699	4,621	2,962	42,446	54,497	80,347	6,688	23,165	9,065	429,366
1925	316,825	158,022	158,803	49,566	10,082	5,424	5,377	5,377	46,757	65,499	120,626	7,881	25,298	13,797	517,523
1926	391,328	151,243	240,085	58,962	9,874	9,155	6,079	4,027	52,186	71,418	121,231	8,203	24,298	16,017	621,530
1927	371,322	182,845	188,477	55,356	11,321	10,923	6,582	5,472	55,297	77,815	142,171	8,645	28,782	15,633	606,474
1928	409,430	149,787	259,643	57,267	10,790	10,087	6,698	4,813	58,848	82,511	121,770	9,548	21,129	10,690	653,794
1929	577,202	161,525	415,677	81,584	11,663	11,077	7,166	5,018	65,990	87,789	134,037	9,696	21,148	6,589	857,434
1928:															
Jan.	27,789	16,618	11,171	5,830	1,605	843	581	525	4,851	7,988	11,774	1,100	2,273	1,025	47,565
Feb.	28,848	12,911	15,937	4,947	1,081	667	581	536	4,052	6,757	8,630	787	1,612	1,276	46,860
Mar.	27,879	10,508	17,371	3,683	775	645	581	269	3,999	5,825	9,690	700	2,750	1,211	47,499
Apr.	20,139	9,335	10,804	3,233	789	630	494	258	3,993	5,040	5,499	736	1,014	1,323	33,810
May	26,483	10,350	16,133	3,091	654	942	494	241	4,943	5,355	10,347	717	2,602	1,135	45,994
June	22,994	16,168	6,826	3,107	963	926	494	451	5,419	5,363	13,655	725	1,399	960	40,788
July	30,481	13,383	17,098	5,129	1,043	905	598	366	5,602	7,566	11,594	698	1,264	878	52,731
Aug.	35,674	15,114	20,560	5,720	398	1,227	593	544	5,668	7,438	11,898	712	1,732	450	56,936
Sept.	29,769	11,239	18,530	4,675	457	988	594	447	4,956	6,536	9,863	969	1,614	494	50,078
Oct.	24,476	12,603	11,873	3,999	864	949	564	457	5,295	7,474	10,124	513	1,399	732	44,248
Nov.	68,135	10,436	57,699	8,005	1,048	772	564	425	4,950	7,902	7,805	943	1,790	623	92,526
Dec.	66,763	11,122	55,641	7,848	1,113	744	565	294	5,120	8,792	10,896	948	2,220	588	94,769
1929:															
Jan.	52,546	13,415	39,131	8,301	1,664	873	600	461	5,640	8,067	11,076	850	2,134	642	79,439
Feb.	47,926	12,103	35,823	7,064	1,117	955	600	495	6,572	7,511	10,384	807	2,104	520	73,982
Mar.	49,448	14,553	34,895	6,583	1,413	758	601	499	5,515	6,620	10,629	658	2,332	786	71,239
Apr.	49,816	11,414	38,402	5,097	727	747	548	306	5,997	6,645	11,321	673	1,950	569	72,982
May	42,960	15,593	28,367	5,723	800	966	548	453	6,264	6,961	13,437	1,059	1,922	733	67,233
June	40,398	14,344	26,054	5,563	1,122	1,061	547	422	5,582	6,693	11,270	757	1,398	548	61,017
July	46,454	15,071	31,383	5,457	974	1,247	641	462	6,422	7,192	13,995	575	1,457	543	70,348
Aug.	50,441	15,469	34,972	6,079	685	993	641	431	4,644	7,298	10,782	1,032	1,563	499	69,619
Sept.	53,484	12,392	41,092	7,993	384	832	640	406	4,708	7,517	10,149	655	1,566	504	76,446
Oct.	47,937	12,516	35,421	8,381	812	1,047	600*	485	4,697	8,295	10,512	893	1,606	445	73,194*
Nov.	46,279	11,204	35,075	6,660	1,065	668	600*	278	4,760	6,711	9,380	771	1,442	400*	67,810*
Dec.	48,513	13,451	35,062	8,683	900	930	600*	320	5,189	8,279	11,102	966	1,674	400*	74,105*
1930:															
Jan.	52,535	9,454	43,081	7,037		791		368	5,709	7,831	8,920		1,837		

(1) Malayan net exports cannot be taken as production, since imported rubber is largely wet native rubber, which is reduced about one-third in weight by remilling; rubber exported as latex is not included which on a basis of 3½ pounds per gallon amounted to 115 tons in 1923, 1,117 in 1924, 3,618 in 1925, 3,263 in 1926, 2,439 in 1927 and 1,437 in 1928. (2) Ceylon Chamber of Commerce statistics until 1926; rubber exported as latex is not included— such shipments were equivalent to 18 tons in 1923, 93 tons 1924, 6 tons 1925, 20 tons in 1926, about ½ ton in 1927, and 1 ton in 1928. (3) Official statistics. (4) Imports into Singapore and Penang. (5) Exports from "Other D.E.I." are chiefly wet native rubber, which is reduced about one-third in weight by remilling; rubber exported as latex is not included which on a basis of 3½ pounds per gallon amounted to 2,342 tons in 1923, 1,008 tons 1924, 2,239 tons 1925, 44 tons in 1926, 84 tons in 1927, and 1,459 tons in 1928. (6) Calculated from official import statistics of principal consuming countries, viz., United States, United Kingdom, France, Germany, Belgium and Netherlands. This figure includes guayule rubber. (7) This total includes the third column for British Malaya, "Gross Exports minus Imports," and all the figures shown for the other territories. *Figure is provisional; final figure will be shown immediately it becomes available.

Net Imports of Crude Rubber into Principal Manufacturing Countries

(Long Tons)

	United States[1]	United Kingdom	France (h)	Germany	Canada (ac)	Japan (da)	Italy	Russia (ee)	Australia (ed)	Belgium (d)	Netherlands	Scandinavia (abcdf)	Spain (g)	Czechoslovakia (abcd)	World Total
1919	236,977	42,671	17,685	5,584	6,395	9,753	9,894	75	1,002	3,995	2,771	3,149	2,418	9	342,378
1920	248,762	56,844	13,885	11,890	11,746	5,297	6,123	62	1,815	3,840	5,510	2,292	2,008	567	370,641
1921	179,678	42,087	15,135	21,920	8,124	21,713	3,906	165	1,014	1,705	1,022	1,279	2,245	569	300,562
1922	296,267	11,724	24,352	27,546	9,207	15,934	6,480	2,498	2,643	172	3,807	1,778	589	567	395,885
1923	300,372	12,700	27,392	18,519	13,277	15,372	8,489	2,986	1,649	2,184	792	2,528	630	1,128	408,018
1924	317,747	-11,550	30,446	22,727	14,299	19,571	8,764	2,346	3,124	2,688	-807	3,178	944	1,370	414,847
1925	381,815	4,061	32,956	33,937	19,683	11,117	11,412	7,088	4,757	2,930	875	3,149	1,155	1,558	516,493
1926	395,667	34,865	34,240	22,775	20,229	18,125	9,809	6,529	9,021	2,498	2,670	4,046	1,299	1,870	613,643
1927	398,483	60,249	34,271	38,892	26,405	20,521	11,381	12,018	9,490	6,482	636	4,224	2,055	2,672	627,789
1928	404,496	4,846	36,498	37,855	30,447	25,621	12,488	15,184	8,480	7,958	2,243	4,418	3,178	3,188	596,695
1928:															
Jan.	37,120	1,921	1,764	2,485	2,290	1,361	760	755	802	589	52	261	335	376	50,871
Feb.	30,926	3,143	2,526	2,984	2,553	1,248	437	783	616	599	98	307	296	297	46,813
Mar.	36,893	3,179	1,902	3,521	2,989	1,694	763	231	918	816	95	351	497	398	54,247
April	35,663	—2,280	2,204	2,719	1,938	2,334	1,114	1,820	832	575	280	339	304	159	48,001
May	28,660	—5,322	3,297	2,944	2,189	2,288	1,090	3,893	655	746	209	485	220	213	41,558
June	25,143	—3,031	3,597	2,968	2,186	2,102	984	4,111	848	743	133	346	251	182	40,063
July	28,170	—1,374	3,518	3,387	2,692	2,026	1,598	724	591	895	395	294	175	384	43,475
Aug.	28,827	48	3,527	2,744	2,447	1,868	875	632	707	519	316	359	58	94	43,021
Sept.	36,800	4,199	3,524	3,553	2,812	1,837	1,278	20	603	597	345	377	277	235	56,457
Oct.	41,667	—934	3,728	4,386	2,943	3,711	1,049	98	766	696	141	527	250	318	59,346
Nov.	33,846	—3,141	3,278	3,694	2,799	2,150	1,340	689	837	544	31	337	252	282	46,938
Dec.	40,781	8,438	3,633	2,470	2,618	3,002	1,145	1,378	755	639	148	435	263	200	65,905
1929:															
Jan.	53,922	11,951	5,645	4,711	3,759	3,776	1,481	956	1,061	749	218	638	179	525	89,571
Feb.	61,881	5,179	5,001	4,613	2,908	2,727	1,259	684	1,131	627	113	226	115	356	86,275
Mar.	46,391	9,068	4,409	4,586	4,961	2,630	1,515	716	725	931	316	354	80	409	77,091
Apr.	52,447	8,295	4,554	5,351	3,177	2,308	1,407	703	1,518	750	144	956	40	445	82,395
May	48,350	5,112	3,152	3,682	2,937	2,314	1,417	996	1,437	854	201	468	37	277	71,223
June	38,676	4,787	6,814	3,948	3,075	1,593	1,624	695	2,215	672	687	507	24	420	65,787
July	40,914	4,993	4,839	3,559	3,205	2,388	2,023	1,056	2,918	1,039	253	519	30	465	68,801
Aug.	35,207	14,594	4,645	4,082	2,879	3,668	908	700*	724	902	254	429	25	319	69,331*
Sept.	32,171	17,010	3,889	4,691	1,908	3,511	1,224	700*	853	672	253	361	91	477	67,811*
Oct.	35,840	16,111	4,489	3,355	1,821	3,902	1,838	700*	1,125	1,147	278	710	91	201	71,608*
Nov.	40,972	13,141	3,082	3,776	2,709	3,221	1,275	700*	1,453	861	253	595	62	280	71,880*
Dec.	40,488	12,434	4,274	2,921	2,114	2,251	1,198	700*		741	52	677			

a—Including gutta percha. b—Including balata. c—Re-exports not deducted in monthly statistics. d—Including some scrap and reclaimed rubber. e—Official statistics of rubber imports by Soviet Russia. f—Including Norway, Sweden, Denmark and Finland. g—United Kingdom and French exports to Spain except in years prior to 1925. h—French imports have been reduced 12 per cent in order to eliminate imports of gutta percha and to reduce to basis of net weight. [1]United States imports of guayule are not included in this compilation; such imports amounted to 4,805 tons in 1926; to 5,010 tons in 1927; to 3,076 in 1928; and to 1,231 tons in 1929. *Figure is provisional; final figure will be shown immediately it becomes available.

Domestic Production of Miscellaneous Rubber Goods

	Rubber Proofed Fabrics Yards	Rubber Heels Pairs	Rubber Soles Pairs	Mechanical Goods Shipments Dollars
1924	25,020,000	196,279,000	(1)	$48,615,000
1925	23,988,000	206,970,000	16,211,620(2)	64,877,000
1926	29,838,000	183,312,000	12,253,000	76,789,000
1927	37,872,000	201,014,000	27,160,000	68,625,000
1928	41,179,000	235,170,000	37,645,000	69,114,000
1928:				
January	2,177,000	17,682,000	3,431,000	$5,630,000
February	2,575,000	19,181,000	3,623,000	5,838,000
March	2,853,000	22,583,000	3,747,000	6,675,000
April	2,416,000	18,575,000	2,922,000	5,406,000
May	2,744,000	21,597,000	3,519,000	6,274,000
June	2,953,000	18,763,000	3,321,000	6,126,000
July	3,447,000	17,620,000	3,168,000	5,157,000
August	4,613,000	21,289,000	3,461,000	6,306,000
September	4,966,000	21,451,000	2,725,000	5,393,000
October	5,914,000	21,932,000	2,297,000	5,237,000
November	4,173,000	18,686,000	2,649,000	5,201,000
December	2,848,000	15,811,000	2,771,000	5,271,000
1929:				
January	2,828,000	19,978,000	3,276,000	6,033,000
February	3,095,000	18,979,000	2,869,000	6,135,000
March	3,952,000	17,226,000	2,746,000	7,013,000
April	4,000,000	17,256,000	2,601,000	7,035,000
May	4,860,000	19,541,000	2,916,000	7,189,000
June	4,409,000	20,007,000	2,502,000	6,792,000
July	4,260,000	19,315,000	1,295,000	6,306,000
August	5,085,000	23,095,000	2,948,000	6,792,000
September	5,507,000	21,702,000	2,841,000	5,906,000
October	6,116,000	22,386,000	3,502,000	5,887,000

(1) Not available; (2) Last 9 months only.
Source: "Survey of Current of Business of the Department of Commerce."

United States Imports of Guayule Rubber and Related Gums

(All quantities in Long Tons)

	Guayule Tons	Guayule Dollars	Balata Tons	Balata Dollars	Jelutong Tons	Jelutong Dollars	Gutta Percha Tons	Gutta Percha Dollars
1919	1,430	760,690	727	987,038	3,332	2,213,964	2,900	1,068,698
1920	758	345,985	1,064	1,260,042	5,672	2,068,501	3,183	1,520,309
1921	58	26,945	814	1,077,859	1,745	351,898	985	333,564
1922	127	57,040	812	978,765	2,335	403,812	818	281,012
1923	1,155	542,227	700	898,524	4,565	853,308	912	375,167
1924	1,856	536,392	464	568,456	6,165	1,237,100	1,408	463,610
1925	3,781	1,803,448	517	574,750	6,749	1,642,531	1,603	629,284
1926	4,305	2,562,096	354	327,218	7,263	3,127,757	1,445	661,156
1927	5,013	2,674,957	582	447,246	7,785	2,448,657	1,494	728,172
1928	3,075	1,755,685	731	430,855	7,552	2,540,059	1,597	777,128
1929	1,231	545,175	728	566,964	8,203	2,458,126	447	167,479
1929:								
July	260	86,175	49	46,440	572	180,065	14	5,807
Aug	190	80,443	58	47,769	575	171,733	—	—
Sept.	107	51,156	38	30,227	913	279,225	—	—
Oct.	200	79,968	58	43,756	636	181,421	—	—
Nov.	125	47,796	13	11,600	583	182,677	49	14,935
Dec.	100	41,328	25	19,955	550	156,939	51	12,095
1930:								
Jan.	150	55,272	28	28,549	509	141,384	—	—

Reclaimed Rubber in the United States

(All Quantities in Long Tons—100% Basis)

Year	Production	Consumption Tons	Consumption % to Crude	Stocks*	Year	Production	Consumption Tons	Consumption % to Crude	Stocks*
1920	86,395	75,297	39.4	.....	1925	132,930	137,105	35.6	13,203
1921	36,725	41,351	24.1	.....	1926	180,582	164,500	45.9	23,218
1922	57,334	54,458	19.3	.....	1927	189,144	178,471	47.6	24,980
1923	74,766	69,584	22.7	.....	1928	208,516	228,000	50.4	24,785
1924	80,079	76,072	22.4	.....	1929	218,954	226,538	48.4	27,464
1928:									
Jan.	14,862	20,140	58.5	21,941	July	17,278	19,070	51.0	17,305
Feb.	15,291	18,670	55.4	20,848	Aug.	19,049	17,890	41.7	15,881
Mar.	17,069	20,680	57.9	19,558	Sept.	18,698	17,795	44.6	17,991
Apr.	15,393	19,280	58.8	19,283	Oct.	17,182	18,420	45.1	17,026
May	18,945	20,215	54.1	18,157	Nov.	18,245	18,380	49.1	22,399
June	18,781	18,140	48.2	18,709	Dec.	17,728	14,320	45.9	24,785
1929:									
Jan.	18,685	21,068	49.1	24,394	July	18,387	20,236	48.7	19,679
Feb.	18,094	19,829	47.7	23,305	Aug.	19,787	18,230	47.6	22,309
Mar.	19,994	20,987	46.7	22,076	Sept.	18,680	17,071	49.2	24,984
Apr.	19,899	22,435	47.3	20,680	Oct.	18,865	18,744	53.8	25,117
May	20,885	23,176	47.1	19,479	Nov.	14,363	15,330	55.4	26,080
June	18,416	18,141	42.0	17,980	Dec.	15,429	11,531	49.0	27,464
1930:									
Jan.	15,010	17,454	47.6	24,241	July	.....	.....	.....	.....
Feb.	.....	.....	.....	.....	Aug.	.....	.....	.....	.....
Mar.	.....	.....	.....	.....	Sept.	.....	.....	.....	.....
Apr.	.....	.....	.....	.....	Oct.	.....	.....	.....	.....
May	.....	.....	.....	.....	Nov.	.....	.....	.....	.....
June	.....	.....	.....	.....	Dec.	.....	.....	.....	.....

*Stocks on hand at the end of month or year. Exports of reclaimed rubber, not shown in this table, amounted to 8,540 tons in 1927, 9,577 tons in 1928, and 12,369 tons in 1929.

REVIEW DESK

Books, New Publications, Catalogues, Etc.

COLORS FOR HARD RUBBER. Laboratory Report No. 136 of Rubber Chemicals Section, E. I. du Pont de Nemours & Company, Inc., Wilmington, Del. 1929. 4 pp. For free distribution.

This report covers the results of tests on eight of the du Pont rubber dispersed colors that have been found to be the most suitable for hard rubber. In all of these tests triphenylguanidine has been used as accelerator—approximately 3 per cent, based on the rubber content of the stock. The sulfur content is in all cases 45 per cent, based on the approximate total rubber content of the stock including the rubber present in the rubber dispersed colors. Three or four formulas are given in the case of each of the colors.

TONOX. Memorandum of the Naugatuck Chemical Company, 1790 Broadway, New York City. 1930. 4 pp. For free distribution.

A new chemical unique in its effect on rubber, Tonox is a solid amine melting at from 60 to 80 degrees Centigrade, soluble in organic solvents and slightly soluble in boiling water. Test data are included in this report to show its effect on abrasion resistance. According to the manufacturer, the 28 separate tests made clearly show that Tonox improves the resistance of different stocks to abrasion.

SOURCES OF INVESTMENT INFORMATION. Issued by the Investment Bankers Association of America, 33 South Clark Street, Chicago, Ill. 1929. 84 pp. For free distribution.

Securing reliable material on the subjects of banking and investments is not always an easy matter without the aid of some source book or bibliography. Prepared by the Exhibit Committee of the Financial Group of the Special Libraries Association, this manual answers the need to a certain extent but does not pretend to be exhaustive. In the case of the rubber industry, for example, only five sources are presented, and there is no mention made of cotton or other commodities.

INDUSTRIAL POWER-FACTOR PROBLEMS SOLVED BY SCALE. Published by the General Electric Company, Schenectady, N. Y. 1929. 4 pp. For free distribution.

Heretofore calculations relating to power factor and its improvement have been difficult, for those most vitally interested did not visualize the conditions that might result from different treatments. The General Electric Company presents in this booklet a new system for solving such problems that consists of laying down to scale the known factors and then scaling the unknown. Ten problems are illustrated and several solutions given for one problem, so that there should be no difficulty in applying the simple rules. A right-angle triangle with the sides in proportion 3 to 4 to 5 is furnished with the booklet.

EXPLANATORY INCOME TAX RETURNS. Published by Sinclair, Murray & Company, 44 Whitehall Street, New York City. 1930. 66 pp. $2.

Based on Form 1040 for individuals, with notes on corresponding items of corporation, partnership and fiduciary returns, this manual is compiled expressly for the calendar year 1929 and should be of help in filing 1930 returns. It is especially complete in its treatment of stock market losses, stock rights, company reorganizations and other capital changes.

ELECTRIC EQUIPMENT FOR HANDLING HEAVY MATERIAL. Published by the General Electric Company, Schenectady, N. Y. 1929. 24 pp. For free distribution.

Modern machinery for the handling of bulk material has been developed to meet a general demand for improved methods. From the handling of bulk material manually forty years ago, the demands of industry have grown until today we have fifteen- to twenty-ton buckets that can move a thousand tons per hour. Especially notable is the saving of time and expense through the quick loading and unloading of cars and vessels. This publication describes the electric equipment in general use for this purpose.

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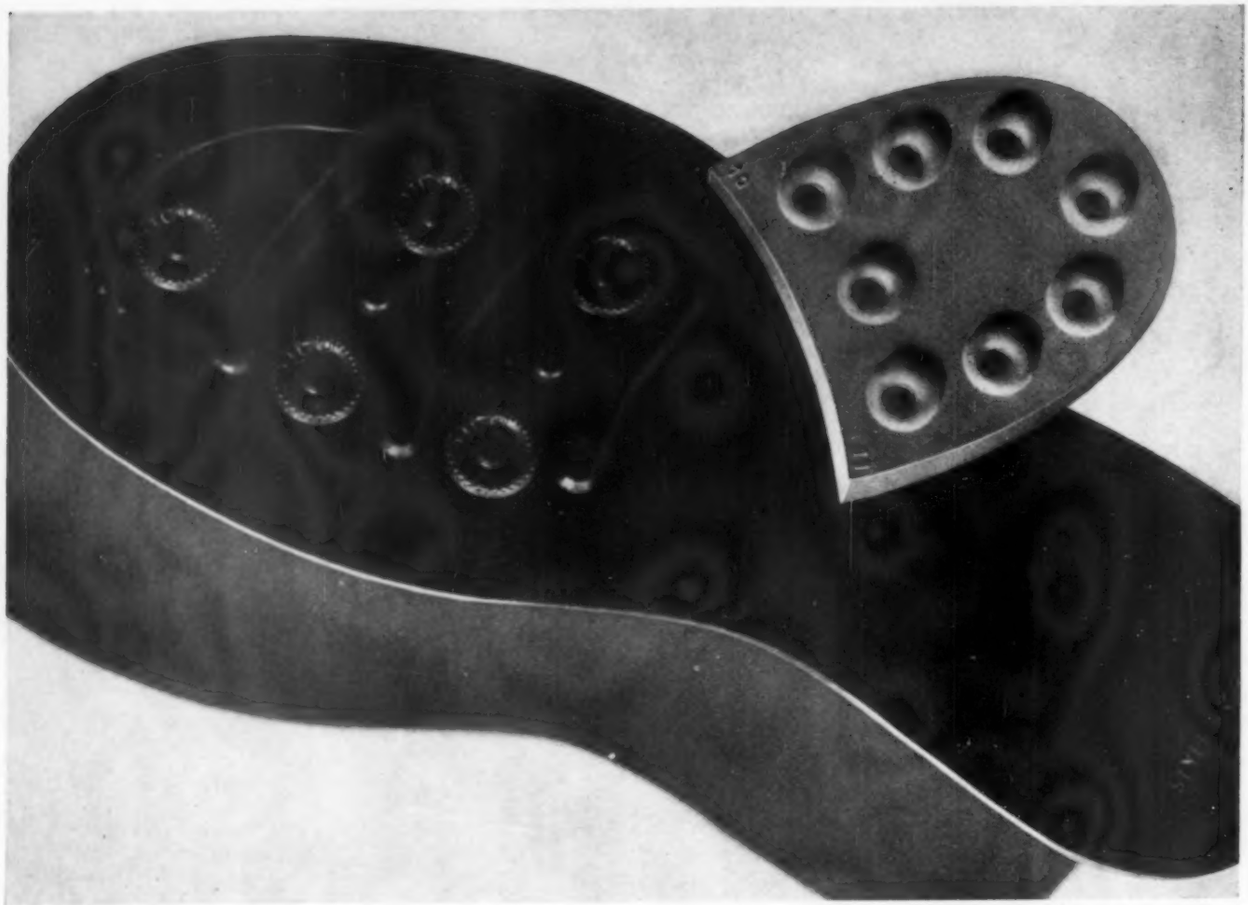

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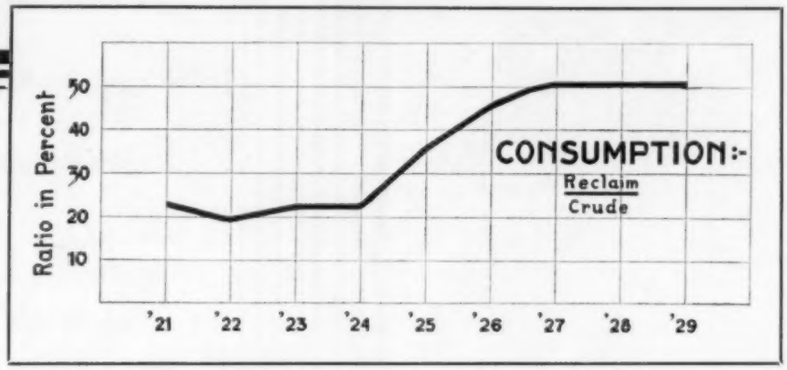
Dyestuffs Department,
Rubber Chemical Division

Fine Rubber Chemicals

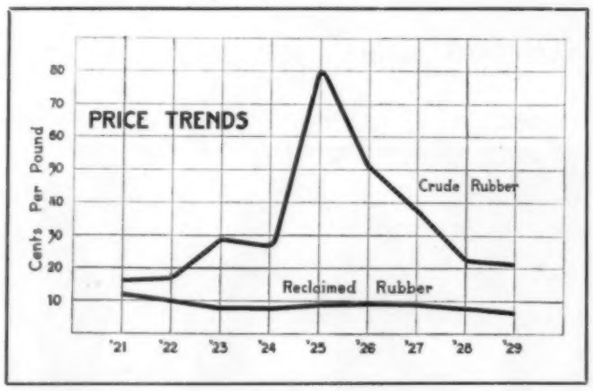
USE OF RECLAIMED RUBBER INCREASES!



The above chart shows one of the important trends of the rubber industry. It carries a message of importance to every executive concerned with rubber purchases.

***Use of reclaimed rubber has increased* in recent years—*in spite* of the great decline in crude rubber prices! The graph shows the exact percentage in proportion to the crude rubber in use. The amount of reclaim is now over 50% of the amount of crude rubber. A large part of this is reclaimed by The Philadelphia Rubber Works Company.**

One of the reasons for this is the high quality of the rubber, as reclaimed by modern methods.



Another important reason is that reclaim prices are stable, while crude rubber prices vary widely, as shown by the small chart below.

May we send you further information?

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———— Rubber Co. making tires, etc., were using a coal tar solvent, because they did not think it possible to use one from petroleum.

———— Rubber Co. making tires, etc., were using a wrong specification petroleum solvent, because the ———— Oil Co. sold it under the name of Rubber Solvent.

———— Rubber Co. making dipped goods were using a wrong specification petroleum solvent, because they did not know they could buy anything else.

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Subject Index

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RUSSELL B. KOONTZ, *President-General Mgr.*

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AKRON, OHIO

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We have added to our usual complete stock the equipment and machinery of the following plants which we are now dismantling:

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SOUTHERN TIRE & RUBBER CO., AUGUSTA, GEORGIA
INTERLOCKING CORD TIRE CO., MOGADORE, OHIO
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Write us for quotations on the items which we have listed below and any other special requirements which you may have.

We list below for this month's particular offerings the few following items from our vast stock of REBUILT GUARANTEED RUBBER WORKING MACHINERY AND EQUIPMENT:

MILLS

24″x26″x84″ Birmingham and Vaughn Mill Units
22″x72″ Farrel Mill Units
20′x22″x60″ Farrel, Vaughn, Thropp and Birmingham units in units of one, two, three and four Mills
18″x50″ and 54″ Thropp, Birmingham and Vaughn Mills
24″, 30″, 36″, 42″ and 45″ Farrel, Birmingham, Allen and Adamson Mills
6″x12″ Experimental Mills
No. 3 Banbury Mixers
No. 9 Banbury Mixers

TUBERS

Nos. ½, 1, 2, 3 and 4 Royle Perfected
2″, 4″ and 8″ Allen and Housatonic
2″ and 4″ Adamson
6″ and 8″ Adamson, Clark, Akron Mold Tubers and Strainers

CALENDERS

24″x66″ Birmingham, Allen, W-S-M and Vaughn Calender Units
22″x60″ Farrel, Vaughn and Birmingham Calenders
18″x54″ Farrel, Birmingham and Thropp Calenders
32″x50″ Bridge's Calenders
16″, 40″ and 48″ Farrel and Birmingham Calenders
All-size two-roll Calenders

WASHERS—CRACKERS—REFINERS

16″x36″ Vaughn Washer Units
18″x30″ and 36″ Farrel heavy duty Crackers
24″ and 30″ Farrel and Birmingham Crackers
22″x30″ Thropp extra heavy duty Cracker
21″x24″x30″ Vaughn and Thropp Refiners
17″x19″x28″ Farrel heavy duty Cracker
16″x20″x40″ Adamson Refiners
14″x18″x30″ Birmingham Refiner
12″x16″x24″ Vaughn Refiner

HYDRAULIC PRESSES

12′, 16′ and 18′ Birmingham and Thropp Belt Presses
30″x60″ Farrel Presses
48″x48″ Southwark and Farrel Presses
42″x42″ Southwark and Farrel Presses
24″, 30″ and 36″ Farrel, Thropp and Southwark Presses
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10′x60″—20″ ram Southwark
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We are prepared to furnish complete plants from stock, and can arrange equipment in any units with proper Drives, Motors and Safety Equipment to comply with State Laws.

NOTE

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The RUBBER AGE

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Abstracts of Technical Papers

THE annual Spring and Fall meetings of the Rubber Division of the American Chemical Society are always of great interest and value to the rubber industry as a whole, in so far as they afford an opportunity for a frank exchange of ideas on the applied chemical problems of the industry. This year, at their meeting in Atlanta, in April, a total of 18 papers will be presented. THE RUBBER AGE is pleased to present abstracts of these papers as a feature in this issue. Abstracts of papers presented before the Cleveland Section of the Society of Automotive Engineers, covering new applications of rubber in the automobile industry, are also published in this issue.

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